EXHIBIT H

Exponent®

Expert Report of Alex Revchuk, D.Env., P.E., BCES

In the matter of *California Sportfishing Protection Alliance v. Pacific Bell Telephone Co.*
Case No. 2:21-cv-00073-JDP

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Acronyms and Abbreviations

AL	Action Level
bgs	below ground surface
CCR	Consumer Confidence Report
CDPR	California Department of Parks and Recreation
CSPA	California Sportfishing Protection Alliance
CWS	community water system
DE	diatomaceous earth
EPA	US Environmental Protection Agency
GAMA	Groundwater Ambient Monitoring and Assessment
gpm	gallons per minute
HDPE	high density polyethylene
LCR	Lead and Copper Rule
LTBMU	Lake Tahoe Basin Management Unit
MCL	Maximum Contaminant Level
MDL	method detection limit
mg/L	milligrams per liter
NTNCWS	non-transient non-community water system
NTU	nephelometric turbidity unit
Pb	lead
ppb	parts per billion
PVC	polyvinyl chloride
RL	reporting limit
RLDWA	Reduction of Lead in Drinking Water Act
SDWIS	Safe Drinking Water Information System
STPUD	South Tahoe Public Utility District
SWRCB	California State Water Resources Control Board
TCPUD	Tahoe City Public Utility District
TNCWS	transient non-community water system
USFS	U.S. Forest Service
WSJ	Wall Street Journal
WTP	water treatment plant
µg/L	micrograms per liter
%-ile	percentile

Limitations

This report summarizes work performed to date and presents the findings resulting from that work. The findings presented herein are made to a reasonable degree of scientific/engineering certainty. A number of opinions have been expressed in this matter by Plaintiff; my lack of comment on every opinion does not signify agreement with any opinion expressed by any Plaintiff or any person disclosed as an assumed expert by Plaintiff. Exponent, Inc. reserves the right to supplement this report and to expand or modify opinions based on review of additional material as it becomes available through ongoing discovery and/or through any additional work or review of additional work performed by others.

1 Assignment and Retention

I, Alex Revchuk, D.Env., P.E., BCES, of Exponent, Inc. (Exponent), was retained by Paul Hastings LLP on behalf of Pacific Bell Telephone Company (Pacific Bell) to identify drinking water systems that are located on the western and southern shores of Lake Tahoe, to understand their treatment processes and operations, and to assess any available lead sampling data associated with these systems in order to discern impacts, if any, from lead-clad telecom cables in Lake Tahoe on drinking water quality. The focus of my evaluation is thus on drinking water supply systems only; this report does not consider recreational water uses.

2 Qualifications and Compensation

I am a Senior Managing Engineer in the Environmental and Earth Sciences Practice at Exponent. My curriculum vitae presenting my education, training, and experience is included in Appendix A, and the matters during the last four years for which I have offered expert reports and testimony are presented in Appendix B.

I am a Professional Engineer (P.E.) licensed in Civil Engineering in California and Nevada. I hold a doctorate in Environmental Science and Engineering (D.Env.), and I am a Board-Certified Environmental Scientist (BCES). I provide professional engineering, science, and litigation support consulting services in several areas including water and wastewater system evaluations and treatment process optimization, beverage manufacturing, process failure root cause analysis, engineering cost estimation, selection of environmental remediation alternatives, environmental forensics, environmental damage allocation, and regulatory compliance. I also advise public agencies and utilities in water, wastewater, and energy sectors; private commercial and industrial entities; beverage manufacturers; medical and recreational facilities; and biomedical device manufacturers.

Exponent is compensated at my standard billing rate of $380/hour.

3 Documents and Information Relied Upon

Documents received from the California State Water Resources Control Board, Division of Drinking Water, related to Emerald Bay State Park, Vikingsholm, Eagle Point Campground, and D.L. Bliss State Park.

Documents received from the California Regional Water Quality Control Board, Lahontan Region, related to Emerald Bay State Park, Vikingsholm, Eagle Point Campground, and D.L. Bliss State Park.

Documents received from the California Department of Parks and Recreation related to Emerald Bay State Park, Vikingsholm, Eagle Point Campground, and D.L. Bliss State Park.

Documents related to sampling events and water testing conducted by Marine Taxonomic Services and Below the Blue from 2022-2023.

Documents related to sampling events and water testing conducted by Haley & Aldrich and Ramboll US Consulting, Inc., in 2021 and 2023, respectively.

Documents related to drinking water sources and intakes in Lake Tahoe, including the Tahoe Regional Planning Agency's Tahoe Open Data, Safe Drinking Water Information System (SDWIS) database, and Groundwater Ambient Monitoring and Assessment (GAMA) database.

Documents related to lead sources in Lake Tahoe, and their effect on recreation and public health.

Expert Report of Craig Jones, Ph.D. Opinions Regarding Lead Fate and Transport in the Matter of California Sportfishing Protection Alliance v. Pacific Bell Telephone Co.; Eastern District of California Case No. 2:21-cv-00073-JDP.

4 Executive Summary

Pacific Bell operated two submarine telecommunications cables that traversed portions of Lake Tahoe. The inner portion of each cable includes a lead jacket. The California Sportfishing Protection Alliance (CSPA) alleges its members boat on, swim in, and drink water drawn from Lake Tahoe, among other lake-water-related activities. CSPA claims that lead from the cables threatens or impairs those uses or contributes to impairments.

I identified 8 water treatment systems located within 2 miles of the lead-clad cables and along the shore of Lake Tahoe. Three of these systems (Eagle Point, Vikingsholm, and Boat Campground, operated by the California Department of Parks and Recreation (CDPR)) are reliant on Lake Tahoe surface water that is drawn from Emerald Bay. A single system (D.L. Bliss, operated by CDPR) is reliant on a spring stream diversion. Four systems (Camp Richardson, Baldwin Beach, Cascade Mutual, and Rubicon) are reliant on groundwater. In the case of the surface water-based systems, this evaluation focused on surface water intakes and treated drinking water data, and in the case of groundwater-based systems, this evaluation focused on groundwater source wells and treated drinking water data.

I then assessed the available lead data associated with these systems in order to discern any impacts from the cables. I found no such impacts. The compiled raw untreated intake and well source water data were all non-detect for lead at their respective method detection limits (MDLs) or reporting limits (RLs), and all were substantially lower than the EPA's 15 ppb lead Action Level.

The Eagle Point System, the potable water system closest to the lead-clad cables, was sampled by CDPR in 2023. The raw Lake Tahoe surface water intake sample was non-detect for lead (<0.5 ppb), and after treatment through the Eagle Point process, the treated water sample had a lead concentration of 0.602 ppb. Both samples were substantially lower than the EPA's 15 ppb lead Action Level. These results were also consistent with the intake sampling conducted at Eagle Point, Vikingsholm, and Boat Campground in 1990, where lead concentrations were non-detect (<5 ppb). Based on their size and service population, all 3 surface-water-sourced systems (Eagle Point, Vikingsholm, and Boat Campground) are classified as transient non-community water systems (TNCWS), which do not require periodic lead sampling of their treated drinking waters. Nonetheless, based on the 2023 Eagle Point data, the historic 1990 CDPR data, and Lake Tahoe data collected by Ramboll in 2023, Haley & Aldrich in 2021, and Chien et al. in 2013-2016, the surface water systems are supplied with raw water that meets the drinking water lead standard. In other words, the raw Lake Tahoe water meets the drinking water lead standard without undergoing water treatment.

The four groundwater systems (Camp Richardson, Baldwin Beach, Cascade Mutual Water Company, and Rubicon) do not draw water directly from Lake Tahoe, but instead tap into local aquifers, sometimes up to several hundred feet underground, for their source water. The Camp Richardson System (4.3 ppb [90th %-ile result, n = 10] sampled on September 30, 2023), and the Rubicon System (7.8 ppb [90th %-ile result, n = 10] sampled in 2021) meet EPA's 15 ppb lead Action Level for drinking water. No lead data was found for Baldwin Beach and Cascade Mutual Water Company systems for either drinking water or source groundwater. Lastly, the historical sampling of the D.L. Bliss System (on October 20, 1990), which relies on a spring-fed stream source, determined lead concentrations to be <5 ppb (non-detect), meeting EPA's 15 ppb lead Action Level for drinking water.

Based on my evaluation, there appears to be greater potential for accumulating lead from plumbing components conveying drinking water sourced from Lake Tahoe than from the proximity of Lake Tahoe surface water intakes to sources of lead in the lake. Overall, the gathered data displays a pattern of lower lead concentrations in environmental waters (Lake Tahoe water and groundwater) and higher concentrations in treated drinking waters. This pattern is consistent with the accepted state of knowledge, whereby corrosion of plumbing components, even those deemed "lead-free," is known to contribute lead to drinking water. In the case of the water systems evaluated herein, none of these lead contributions exceed the EPA's 15 ppb lead Action Level.

Based on my review of the available documentation, my analyses, and my experience and training, I offer the following summary of my opinions in this matter to a reasonable degree of scientific/engineering certainty (note that this executive summary does not contain my full opinions — the main body of this report is the controlling document):

Opinion 1: There are no detected impacts from lead-clad cables on the drinking water systems located within 2 miles of the cables, and all water samples are below the 15 ppb Action Level.

Opinion 2: The raw surface water data is consistent with the findings stated in the expert report of Dr. Craig Jones that any mobilized lead released from the cables would not quantifiably impact water quality at locations away from the cables.

5 Background

Pacific Bell operated two submarine telecommunications cables that traversed portions of Lake Tahoe. The inner portion of each cable includes a lead jacket. This lead jacket surrounds the copper strands and is meant to protect copper strands from contact with water. The lead jacket is covered by layers of steel wiring and jute. The cables are no longer operative. The California Sportfishing Protection Alliance (CSPA) alleges its members boat on, swim in, and drink water drawn from Lake Tahoe, among other lake-water-related activities. The CSPA claims that lead from the cables threatens or impairs those uses and/or contributes to impairments.[1]

To address these claims as they relate to potable water systems that use Lake Tahoe water, I reviewed the federal regulations on lead in drinking water, identified and evaluated the treatment processes and operations of drinking water systems that are located within 2 miles of the lead-clad cables in Lake Tahoe, and assessed the available lead data associated with these systems in order to discern any impacts from the cables.

[1] CSPA v. Pacific Bell. Complaint For Declaratory and Injunctive Relief And Civil Penalties. Filed January 14, 2021.

6 Objectives

I have identified drinking water systems that are located within 2 miles of the lead-clad cables in Lake Tahoe to understand their treatment processes and operations, and to assess any available lead sampling data associated with these systems in order to discern impacts, if any, from the lead-clad cables on drinking water quality from these systems.

7 Lead Drinking Water Regulations

7.1 Sources of Lead in Water

Lead naturally occurs in rocks and mineral deposits that have varying degrees of solubility; leaching of those rocks and minerals can cause relatively elevated lead concentrations in water.[2] There are several substantial anthropogenic sources of lead in water, including, prior to 1978, leaded gasoline and resultant exhaust and lead particulates that were transported to the atmosphere, surface water, and groundwater.[3] Other sources of lead in water include fishing equipment (sinkers), car batteries, and some food cans.[4] Dust – both indoor and outdoor – can also contain substantial amounts of lead from both natural and anthropogenic sources.[5]

According to the US Environmental Protection Agency (EPA), lead is rarely found in significant quantities in naturally occurring sources of water, such as streams, lakes, rivers, or groundwater.[6] Instead, EPA describes common sources of lead in drinking water to be "corrosion of household plumbing systems; erosions of natural deposits."[7] Lead enters drinking water primarily from contributions by plumbing materials.[8] The most common sources of lead in drinking water are lead or lead-containing alloys in pipes, solder joints, faucets, and fixtures.[9] In homes with lead pipes that connect the home to the water main, these pipes are typically the most significant source of lead in the water.[10] Lead pipes are more likely to be found in older cities and homes built before 1986.[11] Among homes without lead service lines, the most

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[2] California State Water Resources Control Board (SWRCB). 2017. Groundwater Fact Sheet Lead (Pb). November. https://www.waterboards.ca.gov/gama/docs/coc_lead.pdf

[3] *Ibid.*

[4] *Ibid.*

[5] *Ibid.*

[6] US EPA. 2020. Understanding the Lead and Copper Rule. September. https://www.epa.gov/sites/default/files/2019-10/documents/lcr101_factsheet_10.9.19.final_.2.pdf

[7] US EPA. 2009. National Primary Drinking Water Regulations table. May. EPA 816-F-09-004. https://www.epa.gov/sites/default/files/2016-06/documents/npwdr_complete_table.pdf

[8] US EPA. 2023. Lead and Copper Rule: Rule Summary. November. https://www.epa.gov/dwreginfo/lead-and-copper-rule

[9] US EPA. 2024. Basic Information about Lead in Drinking Water. June. https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water

[10] *Ibid.*

[11] *Ibid.*

common problem is with brass or chrome-plated brass faucets and plumbing with lead-containing solder.[12]

7.2 EPA's Lead and Copper Rule

In 1991, the EPA published the Lead and Copper Rule (LCR)[13] regulation to control lead and copper in drinking water. The LCR established a lead Action Level (AL) of 15 parts per billion (ppb)[14] based on 90th percentile (%-ile) level of customer tap water samples.[15] An AL exceedance is not an immediate violation, but instead it can trigger other requirements that include water quality parameter monitoring, corrosion control treatment, source water monitoring/treatment, public education, and lead service line replacement.[16] More specifically, if lead concentrations exceed the 15 ppb AL in more than 10% of customer taps sampled, the drinking water system operator must undertake additional actions to control corrosion of plumbing components, and to notify and educate the public on strategies to reduce lead exposure through water.[17]

The LCR requirements apply to all community water systems (CWSs) and non-transient non-community water systems (NTNCWSs).[18] The LCR requirements do not apply to transient non-community water systems (TNCWSs). CWSs are defined as serving at least 15 service connections used by year-round residents or regularly serving 25 year-round residents.[19] The NTNCWSs are defined as serving at least the same 25 non-residential individuals during 6 months of the year.[20] The TNCWSs are defined as regularly serving at least 25 non-residential individuals (transient) during 60 or more days per year.[21]

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12 *Ibid.*

13 56 Federal Register 26460 - 26564, June 7, 1991. https://archives.federalregister.gov/issue_slice/1991/6/7/26457-26582.pdf

14 15 ppb is equivalent to 15 µg/L (micrograms per liter) which is equivalent to 0.015 mg/L (milligrams per liter).

15 US EPA. 2008. Lead and Copper Rule: A Quick Reference Guide. June. EPA 816-F-08-018. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=60001N8P.txt

16 *Ibid.*

17 US EPA. 2024. Basic Information about Lead in Drinking Water. June. https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water

18 US EPA. 2008. Lead and Copper Rule: A Quick Reference Guide. June. EPA 816-F-08-018. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=60001N8P.txt

19 California State Water Boards. Water System Type. https://sdwis.waterboards.ca.gov/PDWW/Help/html_Water_System_Type.htm Accessed on June 13, 2024.

20 *Ibid.*

21 *Ibid.*

7.3 Sample Collection for Lead Monitoring in Drinking Water

The number of water samples collected by CWSs and NTNCWSs for the purposes of monitoring lead concentrations is specified in the LCR and is based on the size of population served. The CWSs and NTNCWSs must collect first-draw samples at taps in homes/buildings that are at high risk of lead contamination as identified in 40 CFR 141.86(a).[22,23] The CWSs and NTNCWSs are required to conduct lead monitoring every 6 months, unless they qualify for reduced monitoring.[24]

Monitoring for LCR compliance involves collection of first-draw samples in customers' homes/buildings. The reason for sampling locations to be in customer homes/buildings, as opposed to say at the water treatment plant immediately after treatment or in the water distribution system (water mains), is because, as described above, the primary sources of lead in drinking water are the household plumbing components. The reason for first-draw samples is to represent water quality of a customer's water tap after water has been in constant contact with household plumbing for some length of time. The EPA defines "first-draw" sample as water that has stood motionless in the plumbing system for at least 6 hours.[25] Thus, per the LCR, the first-draw sample collected at a customer's home/building will represent the worst-case drinking water lead exposure scenario: drinking water that has been in contact with household plumbing components for over 6 hours (akin to filling a glass of water first thing in the morning and drinking it).[26]

7.4 Lead Content in Plumbing Components

Lead pipes are more likely to be found in older cities and homes built before 1986.[27] Among homes without lead service lines, the most common problem is with brass or chrome-plated

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[22] US EPA. 2008. Lead and Copper Rule: A Quick Reference Guide. June. EPA 816-F-08-018. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=60001N8P.txt

[23] 40 CFR 141.86(a). https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-141/subpart-I/section-141.86

[24] US EPA. 2008. Lead and Copper Rule: A Quick Reference Guide. June. EPA 816-F-08-018. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=60001N8P.txt

[25] 40 CFR 141.86(b)(2). https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-141/subpart-I/section-141.86

[26] To avoid this worst-case scenario and to reduce lead in drinking water, EPA recommends flushing pipes by running the taps. Specific runtime recommendations are done by local utilities based on their system-specific knowledge (US EPA. 2024. Basic Information about Lead in Drinking Water. June. https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water).

[27] US EPA. 2024. Basic Information about Lead in Drinking Water. June. https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water

brass faucets and plumbing with lead solder.[28] In 1986 Congress amended the Safe Drinking Water Act, prohibiting the use of pipes, solder or flux that were not "lead-free" in public water systems or plumbing in facilities providing water for human consumption. In 1986 "lead-free" was defined as solder and flux with no more than 0.2% lead and pipes with no more than 8% lead.[29] In 2011 Congress passed the Reduction of Lead in Drinking Water Act (RLDWA) revising the definition of "lead-free" by lowering the maximum lead content of the wetted surfaces of plumbing products (such as pipes, pipe fittings, plumbing fittings and fixtures) from 8% to a weighted average of 0.25% (the RLDWA went into effect in January 2014).[30] Plumbing and fixture components still in service, however, could still contain 8% (80,000 ppm) lead and even those meeting the 0.25% (2,500 ppm) lead weighted average are not truly "lead-free." Thus, plumbing components even at the current standards can contribute a small amount of lead to drinking water.

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28 *Ibid.*

29 US EPA. 2024. Use of Lead Free Pipes, Fittings, Fixtures, Solder, and Flux for Drinking Water. June. https://www.epa.gov/sdwa/use-lead-free-pipes-fittings-fixtures-solder-and-flux-drinking-water

30 *Ibid.*

8 Geographic Extent of Evaluation

The geographic extent of my evaluation was informed by proximity to the lead-clad cables, water treatment plant (WTP) intake locations, and dispersion modeling of lead in water conducted by others.

The two lead-clad cables in question (Cables A and B) are located in the southwestern corner of Lake Tahoe. Cable A transects the mouth of Emerald Bay, where Emerald Bay meets the main portion of Lake Tahoe. Cable B runs along the southwestern shoreline of Lake Tahoe starting west of Baldwin Beach on the south end and ending at Rubicon Bay on the north end.

For the purposes of this report, I considered water systems that are within 2 miles (3,219 meters) of any portion of the cables, and that are located along the shore of Lake Tahoe. The 2-mile extent is a highly conservative evaluation when considering the findings of Dr. Craig Jones' report titled "Opinions Regarding Lead Fate and Transport in the Matter of California Sportfishing Protection Alliance v. Pacific Bell Telephone Co.; Eastern District of California Case No. 2:21-cv-00073-JDP" (Jones 2024).[31] The results from dispersion modeling performed by Dr. Jones shows that any lead from the cables is rapidly diluted within the lake water. According to Dr. Jones' report, using accepted modeling methodology, the concentration of any lead released is diluted by over an order of magnitude within a distance of 5 meters away from the source.

There are eight drinking water systems that are located along the shore of Lake Tahoe and are within 2 miles from the ends of Cables A and B (listed south to north):

1. U.S. Forest Service's (USFS) Camp Richardson System – groundwater-sourced
2. USFS's Baldwin Beach System – groundwater-sourced
3. Cascade Mutual Water Company System – groundwater-sourced
4. Eagle Point, California Department of Parks and Recreation's (CDPR) Emerald Bay State Park – Lake Tahoe-sourced
5. Vikingsholm, CDPR Emerald Bay State Park – Lake Tahoe-sourced
6. Boat Campground, CDPR Emerald Bay State Park – Lake Tahoe-sourced
7. CDPR D.L. Bliss State Park System – spring/stream-sourced
8. Tahoe City Public Utility District (TCPUD) Rubicon System – groundwater-sourced

[31] Jones. 2024. Opinions Regarding Lead Fate and Transport in the Matter or California Sportfishing Protection Alliance v. Pacific Bell Telephone Co.; Eastern District of California Case No. 2:21-cv-00073-JDP. Integral Consulting Inc.

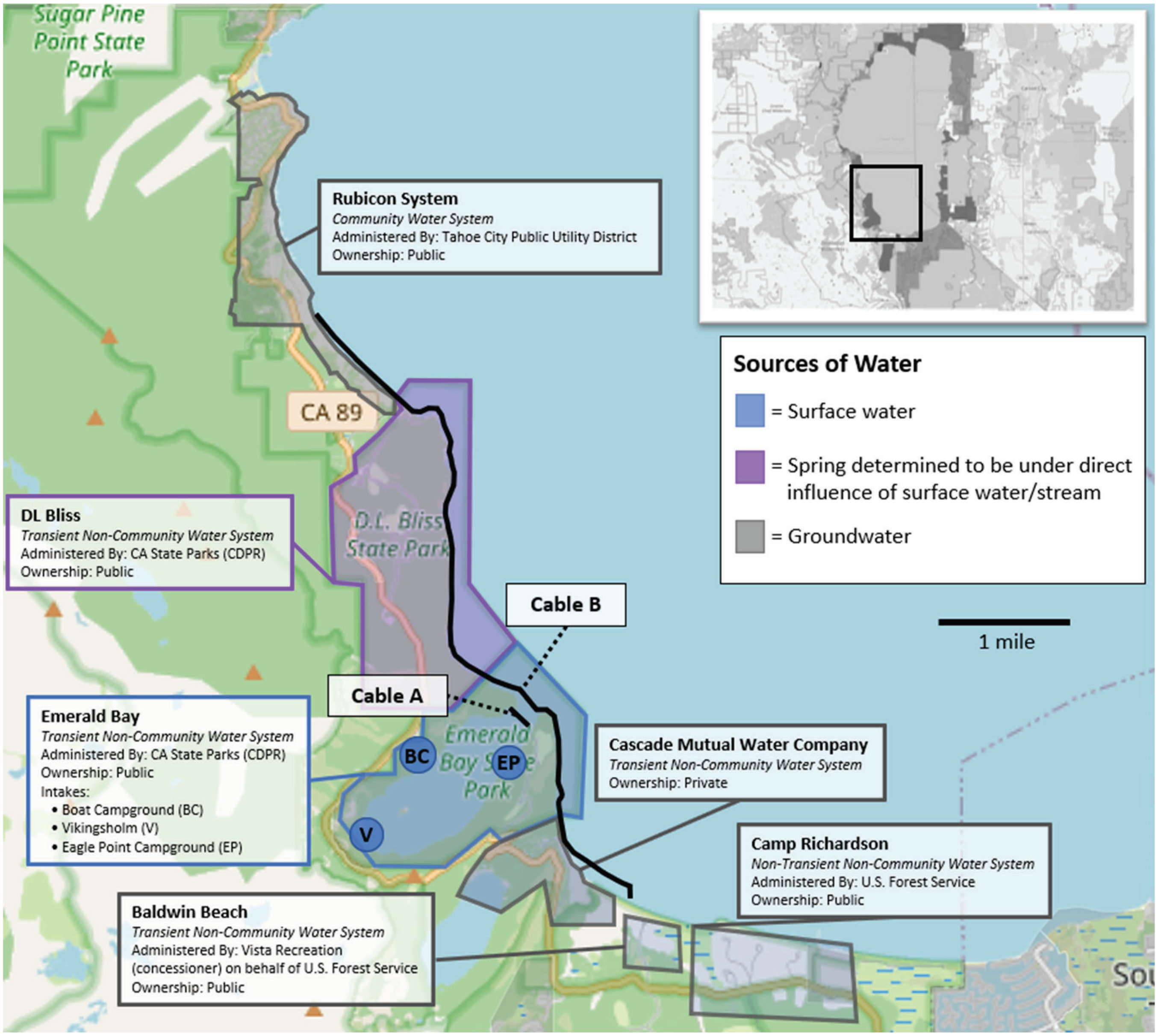

Figure 1. Spatial Domain of the Evaluation

Seven of the eight systems are directly adjacent to the cables (Figure 1),[32] and the Camp Richardson System, which is on the southern shore of Lake Tahoe, is within 2 miles of the

[32] Water system boundaries depicted on Figure 1 are based on publicly available data from Tahoe Open Data (https://data-trpa.opendata.arcgis.com/maps/cd0fbc6107cc43a99e067367c1e5547f), except for the Camp Richardson and the Baldwin Beach Systems, whose extents were approximated based on personal

southern end of Cable B. I have considered and described all eight water systems in this report, but focus on the CDPR's Emerald Bay systems as they rely solely on Lake Tahoe surface water, whereas the other systems rely either solely on groundwater, or other surface water sources.

communications with Michael Alexander of the US Forest Service on June 24, 2024. Boundary data presented on Figure 1 was last updated on May 10, 2023, and last accessed on December 20, 2023.

9 Drinking Water Systems within Geographic Extent

Drinking water treatment systems within a 2-mile proximity to the cables include systems that rely on surface water (Lake Tahoe or spring water) and groundwater water sources (Figure 1). Below, each water treatment system within the geographic extent is discussed in detail, starting with Lake Tahoe-sourced and spring/stream-sourced systems operated by the CDPR, followed by groundwater-sourced systems (from south to north along the west shore of Lake Tahoe).

Note: Emerald Bay State Park consists of three individual drinking water treatment and water distribution systems – at Eagle Point, Vikingsholm, and the Boat Campground. Each system is discussed individually below.

9.1 Emerald Bay – Eagle Point

The Eagle Point System (also referred to as the "Eagle Camp" System in some documents) is solely a Lake Tahoe surface water-sourced system operated by qualified employees of the CDPR. According to the 2020 Engineering Report, the Eagle Point system is a transient non-community water system (TNCWS), and its water treatment plant is classified as a T2[33] water treatment facility.[34] The water system is seasonal and typically operates between June and September depending on weather, serving 13 connections consisting of hose bibs throughout the Eagle Point Campground.[35]

9.1.1 Intake

Water for the Eagle Point System is sourced from Emerald Bay, which is located in the southwest portion of Lake Tahoe. In terms of distance to the telecom cables in Lake Tahoe, the intake for the Eagle Point System is the closest source of drinking water for any systems that use Lake Tahoe surface water. The Eagle Point water intake is approximately 400 m from the nearest cable (Figure 12). The intake consists of a 2-inch galvanized steel pipe that is 85 ft long

[33] The classification of the water treatment plant as a "T2" plant means the facility's total points range between 20-39. Total points are calculated based a multitude of factors such as concentration of each contaminant and treatment processes used (Cal. Code Regs. tit. 22 § 64413.1, accessed on June 17, 2024). According to the 2020 Engineering Report, the distribution system is not classified (e.g., D1, D2, etc.) because the Eagle Point System is a TNCWS.

[34] State Water Resources Control Board (SWRCB). 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 2.

[35] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 2.

and that reportedly drops to 90 ft below lake surface.[36] In contrast, a 1991 drawing indicates that the intake is 80 ft long and 25 ft below lake surface (Figure 2).[37] Another CDPR document indicates that the intake is located approximately 150 ft into Emerald Bay at a depth of 25 ft from lake surface.[38]

The exact coordinates for the end of the intake pipe are unknown, but I estimated them to be approximately 38°57'40.73"N and 120° 5'2.98"W (Figure 3).[39] The intake pump is of a submersible design with a capacity of 45 gallons per minute (gpm).[40] The intake pump is accessed through a concrete vault located near the shoreline (38.961083, -120.083925 coordinate provided by the CDPR). The water is then pumped to a black tank by the WTP, and then through the water treatment process.[41]

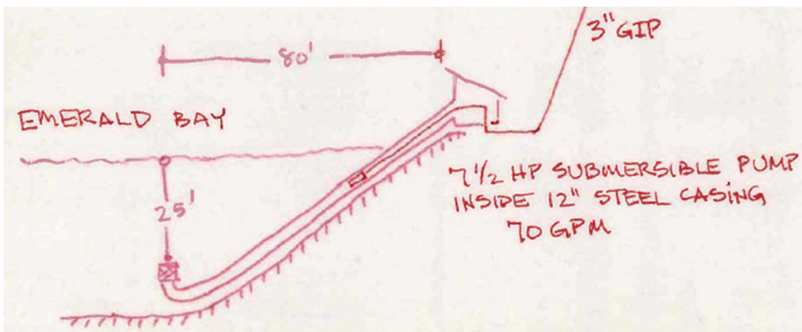

Figure 2. 1991 CDPR Drawing of Eagle Point Intake

[36] CDPR. 2007. Surface Water Assessment Forms. Eagle Point Campground. February. pp. 4.

[37] CDPR. 1991. Detail from the hand-drawn schematic of the Eagle Point Campground water system. pp. 2.

[38] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 3.

[39] This estimate is based on an email exchange between CDPR and the Wall Street Journal (WSJ). First, the CDPR provided a shoreline coordinate where the intake pipe comes on shore (38.961083, -120.083925) in CDPR's spreadsheet titled "Approximate GPS Coordinates of Intakes.xls". Second, in the CDPR-WSJ email exchange in June 2023, WSJ disclosed that Beyond the Blue's (BTB) sampling location to be 38.96152845218525, -120.08395061627765, and the CDPR explained that the intake location is "approximately 100 feet west of the coordinates you [WSJ] provided." [CDPR-WSJ Email Exchange, pp. 6-7]. Exponent's estimate is halfway between a true west measurement and a south-west measurement which may be more appropriate to an observer standing on the shoreline (coordinate provided by the CDPR – see Figure 3). Note that Exponent's estimate is about 100 ft offshore, compared to the 80-ft distance indicated in the 1991 diagram, and the 150-ft distance listed in SWRCB's 2020 Eagle Point Engineering Report. Nonetheless, the Eagle Point intake is in this general vicinity.

[40] CDPR. 2007. Surface Water Assessment Forms. Eagle Point Campground. February. pp. 4.

[41] CDPR. 2019. Eagle Point Campground Daily Waterplant Operations Manual. June. pp. 8.

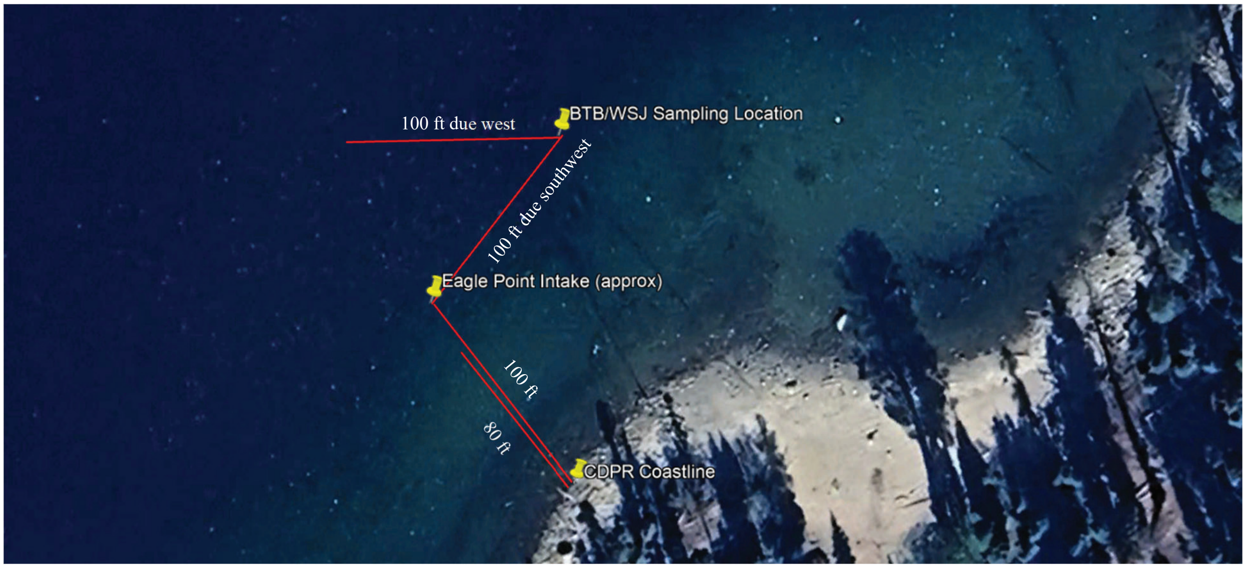

Figure 3. Eagle Point Intake Location (approximate)

9.1.2 Water Treatment Process

Eagle Point's 60 gpm[42] WTP process consists of filtration and chlorination. Namely, two 30 gpm parallel treatment trains consisting of Schneider Co. Model 85 diatomaceous earth (DE) filtration systems filter the water, followed by dosing of chlorine for disinfection. The DE filtration system is self-contained and semi-automated; it monitors influent and effluent turbidity and has a number of alarms and fail-safe regimes to assure proper operation by preventing turbid water being served to consumers.[43] According to the CDPR, Eagle Point's raw water turbidity "is typically less than 0.3 NTU."[44] Average treated turbidity in 2023 ranged from 0.085 to 0.204 NTU[45] (June and September, respectively), with a maximum measured turbidity of 0.330 NTU in June 2023.[46] For comparison, the drinking water regulations require that treated water turbidity must be less than or equal to 0.3 NTUs in at least 95% of the samples in any

[42] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 2.

[43] Schneider Co. 1996. Model 85 Filter System Manual. pp. 9.

[44] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 4.

[45] Nephelometric turbidity units (NTU) are used to express measurement of turbidity.

[46] CDPR. 2023. Tables titled "Monthly Summary of Monitoring for Surface Water Treatment Regulations" for June and September 2023.

month.[47] Therefore, *raw water* at the Eagle Point intake in Emerald Bay generally meets the turbidity *drinking water* standard prior to treatment.

After the water has been filtered, it is disinfected by dosing of chlorine, targeting a 1.5 mg/L concentration; a chlorine residual analyzer monitors chlorine dose prior to treated water being served to customers.[48] Filtered and chlorinated water is stored in two (2) 25,000-gal tanks: Tank 1 (the lower tank) serves the lower portion of the Eagle Point campground, and Tank 2 (the upper tank) serves the upper portion of the campground.[49,50]

After consumption and use of drinking water, the resulting wastewater generated at Eagle Point is routed via sewer mains to the South Tahoe Public Utility District (STPUD).[51] Note that septic systems are prohibited in the Tahoe Basin,[52] and that since 1968 all wastewater in the Tahoe region is pumped out of the region to avoid wastewater discharges into Lake Tahoe.[53]

9.1.3 Plumbing Materials

According to several documents, the Eagle Point System does not contain lead-based plumbing components. For example, "Reportedly, there are no lead pipes, joints, or solder used in the distribution system."[54] The plumbing components are characterized as "Approximately 60 percent of the pipe is asbestos cement, 30 percent is galvanized, and 10 percent is steel-tar and wrapped."[55]

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47 US EPA. 2009. National Primary Drinking Water Regulations table. May. EPA 816-F-09-004. https://www.epa.gov/sites/default/files/2016-06/documents/npwdr_complete_table.pdf

48 SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 7.

49 SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 7 and 10.

50 CDPR. 2019. Eagle Point Campground Daily Waterplant Operations Manual. June. pp. 8-9.

51 CDPR. 2007. Surface Water Assessment Forms. Eagle Point Campground. February. pp. 4 and 9.

52 CDPR. 2007. Surface Water Assessment Forms. Eagle Point Campground. February. pp. 10.

53 TRPA (Tahoe Regional Planning Agency). Regional Plan Update Draft EIS. https://www.trpa.gov/wp-content/uploads/documents/archive/3.13_Public_Svcs__Util.pdf

54 SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 11.

55 *Ibid.*

9.1.4 Available Lead Water Quality Data

According to CDPR's 2020 Engineering Report, "Eagle Camp is not required to prepare a consumer confidence reports (CCR) because it is a Transient Noncommunity water system."[56] Further, the same report states that "Eagle Camp is not required to conduct lead and copper sampling or disinfection byproduct monitoring because it is a transient noncommunity water system."[57] In the 2023 Compliance Inspection Report, CDPR states that "As a TNCWS, Eagle Point is not required to monitor for distribution system lead and copper pursuant to CCR Title 22, Chapter 17.5."[58] Lastly, CDPR explained to the Wall Street Journal (WSJ) in an email exchange that:

> "State Parks does not currently treat or test the water for lead. The system was tested for all contaminants, including lead when it was established in 1990. This is 100% consistent with regulations applicable to this transient/non-community water system."[59]

The exclusion of Eagle Point System from lead sampling requirements is consistent with the LCR regulations, which, as discussed in Section 7.2 above, are applicable only to the community water systems (CWSs) and non-transient non-community water systems (NTNCWSs).

Therefore, the Eagle Point System does not regularly sample for lead. Based on available data, I understand that lead was analyzed in intake water on October 20, 1990, and was found to be <5 ppb (essentially non-detect at 5 ppb reporting level).[60] I am not aware of any documentation that memorialized sample collection procedures associated with these samples.

The intake water quality sampling of the Eagle Point system conducted on October 20, 1990, is referenced several times in permitting documents when explaining CDPR's current sampling practices. For example, the CDPR states that it does not monitor inorganic chemicals because:

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[56] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 13.

[57] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 15.

[58] CDPR. 2023. 2023 Compliance Inspection Of the Emerald Bay State Park – Eagle Point Public Water System (PWS NO. 0910303). pp. 15.

[59] CDPR-WSJ Email Exchange. 2023. Email from CDPR to WSJ dated May 25, 5:47 pm.

[60] CA Drinking Water Watch. Water System Detail. Water System No.: CA0910303. Water System Name: CA State Parks - Emerald Bay, Eagle Poin (sic). https://sdwis.waterboards.ca.gov/PDWW/JSP/NMonitoringSchedules.jsp?tinwsys_is_number=309&tinwsys_st_code=CA&ReportFormat=SR. Accessed on June 13, 2024.

> "Pursuant to CCR Title 22, Chapter 15, only TNCWS that use surface water and serve more than an average daily population of 1,000 persons are required to routinely sample for inorganic chemicals (including perchlorate). Eagle Point reports that its seasonal daily maximum is 1,000 persons and that its average daily maximum is less than 1,000 persons. No further monitoring is required at this time."[61]

CDPR again quotes the October 20, 1990, intake monitoring date as its last inorganic chemical monitoring event.[62]

Further, I understand that lead was sampled by the CDPR after inquiries from the WSJ in May 2023. Two lead samples were collected:

- Raw Lake Tahoe surface water from the Eagle Point intake on June 1, 2023 – results were non-detect for lead at a reporting limit of 0.500 ppb (Figure 4).[63] These results were communicated by the CDPR to the WSJ in an email exchange as "none detected at or above the legal reporting limit."[64]
- Treated water from the Eagle Point System on June 13, 2023 – results were 0.602 ppb lead[65] (Figure 5).[66] I am not aware of any documentation that memorialized sample collection procedures associated with this sample.

Also in June 2023, CDPR submitted a "Seasonal Water System Shutdown Notification & Start-Up Certification Form" to the State Water Board requesting that the Eagle Point water system be opened to the public with an anticipated reopening date of July 16, 2023, approximately one month after Eagle Point's distribution lead sampling. The form documents the inspection, flushing, disinfection, and bacteriological and disinfectant residual monitoring activities performed by CDPR in early June 2023 prior to requesting the start up.

Based on the 1990 and 2023 lead concentration data, the Eagle Point drinking water system met the 15 ppb lead AL drinking water standard.

[61] CDPR. 2023. 2023 Compliance Inspection Of the Emerald Bay State Park – Eagle Point Public Water System (PWS NO. 0910303). pp. 12.

[62] *Ibid.*

[63] Figure 4 was developed from Cranmer Engineering Inc. Eagle Point Intake Laboratory Report, dated June 5, 2023.

[64] CDPR-WSJ Email Exchange. 2023. Email from CDPR to WSJ dated June 6, 8:22 pm.

[65] CDPR-WSJ Email Exchange. 2023. Email from CDPR to WSJ dated June 16, 3:11 pm.

[66] Figure 5 was developed from Cranmer Engineering Inc. Eagle Point Distribution Laboratory Report, dated June 15, 2023.

Regarding enforcement history of the Eagle Point System, the CDPR's 2020 Engineering Report states:

> "The Division [of Drinking Water of the State Water Resources Control Board] has not taken any enforcement actions against Eagle Camp during the last five years. There does not appear to be any compliance issues that would necessitate an enforcement action now."[67]

[67] State Water Resources Control Board (SWRCB). 2020. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1. pp. 2.

Cranmer Engineering, Inc.
Integrated Engineering Services

Sample Results

California State Parks
PO Box 266
Tahoma, CA 96142

Work Order: GFF0048
Received: 06/01/23 15:00
Reported: 06/05/23 12:49

Eagle Point WS-Chemical (Non Compliance) System Number: 0910303

Sample Site: Eagle Point Intake
Sample Number GFF0048-01

Date Collected: 06/01/2023 9:35
Collected by: SF
Title 22 Designation:

	Result	Units	Reporting Limit	Method	Analyst Initials	Analysis Setup Time	Analysis Date
Lead	ND	µg/L	0.500	EPA 200.8	NBB	06/02/23 12:15	06/02/23

Term and Qualifier Definitions

Item	Definition
ND	None detected at or above the reporting limit

Figure 4. Eagle Point Intake Lead Result, June 1, 2023

Cranmer Engineering, Inc.
Integrated Engineering Services

Sample Results

California State Parks
PO Box 266
Tahoma, CA 96142

Work Order: GFF0546
Received: 06/13/23 15:20
Reported: 06/15/23 12:40

Eagle Point WS-Chemical (Non Compliance) System Number: 0910303

Sample Site: Eagle Point Distribution
Sample Number GFF0546-01

Date Collected: 06/13/2023 12:50
Collected by: HAS
Title 22 Designation:

	Result	Units	Reporting Limit	Method	Analyst Initials	Analysis Setup Time	Analysis Date
Lead	0.602	µg/L	0.500	EPA 200.8	NBB	06/14/23 14:54	06/14/23

Term and Qualifier Definitions

Item	Definition
ND	None detected at or above the reporting limit

Figure 5. Eagle Point Distribution (Treated Water) Lead Result, June 13, 2023

9.2 Emerald Bay – Vikingsholm

The Vikingsholm System is solely a Lake Tahoe surface water-sourced system operated by qualified employees of the CDPR. According to the 2020 Engineering Report, the Vikingsholm System is a transient non-community water system (TNCWS), and its water treatment plant is classified as a T2 water treatment facility; its distribution system is not classified because it is a TNCWS.[68] The water system is seasonal and typically operates between June and September depending on weather, serving 2 connections: a drinking water fountain outside of Vikingsholm Castle, and a caretaker's residential apartment near the castle.[69]

9.2.1 Intake

The approximate coordinates of the Vikingsholm intake are 38°57'11.53"N and 120° 6'21.35"W (Figure 6). This is based on CDPR-provided photos indicating that the intake pump is located on the Vikingsholm boat deck,[70] and a hand-drawn schematic of the Vikingsholm system with the "Intake pump @ pier" note.[71] The coordinates listed above are based on 100 ft length from the end of the deck, and illustrated on Figure 6, although as noted below, the intake may extend 140 ft into the bay.

[68] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 13

[69] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 13.

[70] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 67

[71] CDPR. 2012. Handwritten Schematic of the Vikingsholm System prepared for the 2012 inspection. August 20. pp. 2

Figure 6. Vikingsholm Intake Location (approximate)

The specifics of the Vikingsholm System intake are described in various documents as:

- "Reportedly, a 2-inch line extends laterally out into the bay about 140 feet. Influent line draws from lake floor. Recreational activities, such as boating, have an effect on water quality and turbidity."[72]
- "2-inch galvanized steel"; "approximately 100 ft in length"; "drops to 95 ft."[73]

9.2.2 Water Treatment Process

Vikingsholm's 2 gpm water treatment process consists of a raw water pipeline and pump connected to the intake, 100-gal pressure tank, pre-membrane filter, membrane filter (Memclear

[72] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 48

[73] CDPR. 2007. Surface Water Assessment Forms. Emerald Bay State Park – Vikingsholm Castle. pp. 4

Desal DK5 thin film nanofilter[74]), post-membrane filter (rated for 0.020-micron to capture particulates that make it through the membrane), chlorine disinfection, treated water booster pump, three 199-gal pressure vessels contact tanks/storage, and treated water distribution system to the water fountain and caretaker's apartment.[75] According to CDPR, the nanofiltration membrane qualifies for filtration removal credits of 4-log for Giardia and 1-log for viruses. [76] The nanofiltration system is also given credit for 99% (2-log removal) of cryptosporidium.[77]

The water treatment process is programmed to alarm when treated water turbidity is too high, chlorine residual is too low, or flowrate is outside specifications.[78] The alarms are designed to account for situations requiring operator attention. Critical plant alarms will perform an automatic plant shutdown.[79] According to the CDPR, Vikingsholm's raw water turbidity is less than 0.5 NTU and typically averages around 0.3 NTU.[80]

After consumption and use of water, the resulting wastewater generated at Vikingsholm is collected and contained in vault toilets which are "pumped out and disposed of offsite on a regular basis."[81] As discussed in Section 9.1.2, all wastewater in the Tahoe region is pumped out of the region to avoid wastewater discharges into Lake Tahoe.

9.2.3 Plumbing Materials

According to reviewed documents, the Vikingsholm System does not contain lead-based plumbing components: "Reportedly, there are no lead pipes, joints, or solder used in the distribution system."[82] Vikingsholm plumbing components are characterized as 55% galvanized

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74 Sakaji et al. 2001. California Surface Water Treatment Alternative Filtration Technology Demonstration Report. June. https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwdocuments/aftr6_2001.pdf

75 SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 14, 17, 18, 44

76 SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 17

77 *Ibid.*

78 SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 19

79 SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 22

80 SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 15

81 SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 49

82 SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 21

and 45% copper (with a blank entry for fraction of leaded components).[83] Also, "no" is checked on a form detailing construction practices which include: "lead pipes, joints, or solder used in the distribution system."[84]

9.2.4 Available Lead Water Quality Data

According to CDPR, "Vikingsholm is not required to monitor for distribution system lead and copper," nor is it required to generate annual CCRs due to its TNCWS classification.[85] Therefore, the Vikingsholm System does not regularly sample for lead. The exclusion of the Vikingsholm System from lead sampling requirements is consistent with the LCR regulations, which, as discussed in Section 7.2 above, are applicable only to the community water systems (CWSs) and non-transient non-community water systems (NTNCWSs).

Based on available data, I understand that lead was analyzed in Vikingsholm's intake water on October 20, 1990, and was found to be <5 ppb (essentially non-detect at 5 ppb reporting level).[86]

Regarding enforcement history of the Vikingsholm System, the 2020 permit states:

> "The Division [State Water Resources Control Board, Division of Drinking Water] has not taken any enforcement actions against Vikingsholm during the last five years. There does not appear to be any compliance issues that would necessitate an enforcement action now."[87]

9.3 Emerald Bay – Boat Campground

Boat Camp is located on the northern shore of Emerald Bay in Lake Tahoe, and consists of a campground that is readily accessible via a dock. The Boat Camp System is solely a Lake Tahoe surface water-sourced system operated by qualified employees of the CDPR. According to the 2020 Engineering Report, the Boat Camp System is a transient non-community water system

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[83] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 39

[84] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 52

[85] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 24, 56

[86] CA Drinking Water Watch. All Sampling Results. Water System No.: CA0910302. Water System Name: CA State Parks - Emerald Bay, Vikingshol (sic). All Sampling Results. Accessed on June 14, 2024.

[87] SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22. pp. 13.

(TNCWS), and its water treatment plant is classified as a T2 water treatment facility.[88] The water system is seasonal and typically operates between June and September depending on weather, serving 5 connections consisting of hose bibs throughout the Boat Camp Campground.[89]

9.3.1 Intake

Approximate Boat Camp System intake coordinates are 38°57'32.84"N and 120° 5'44.84"W, based on a 140 ft length from the end of the Boat Camp deck (Figure 7).

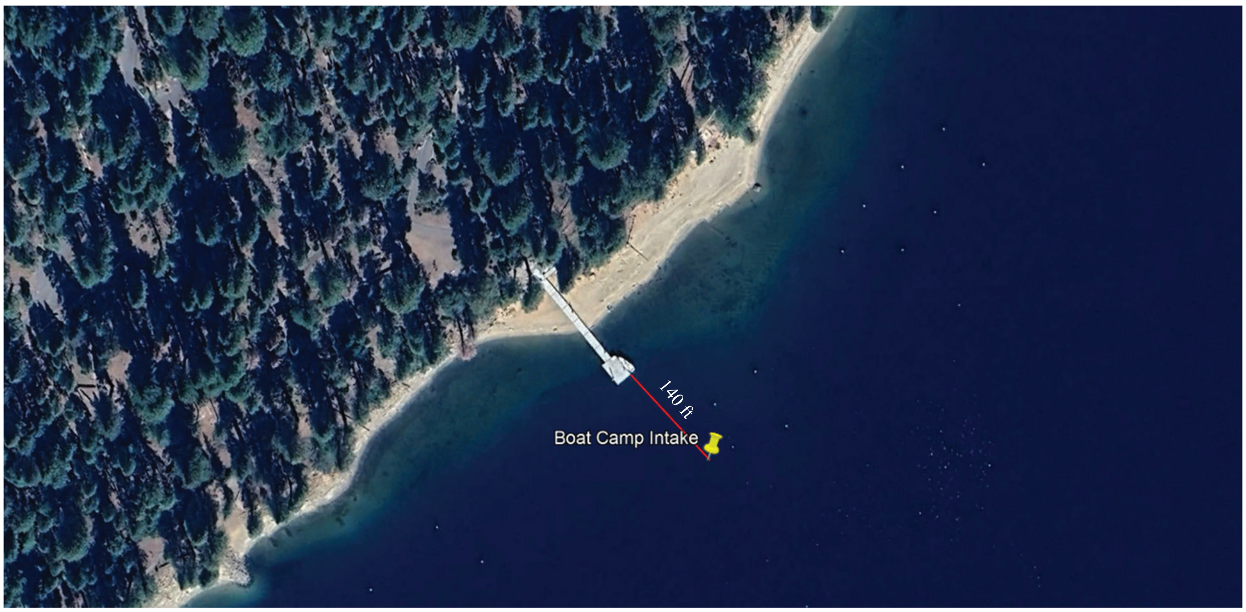

Figure 7. Boat Camp Intake Location (approximate)

The Boat Camp System intake is described as:

> "…a 2-inch line extends laterally out into the bay for about 140 feet from the boat deck. Influent line draws from the lake floor. Recreational activities, such as boating, have an effect on water quality and turbidity."[90]

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[88] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 12.

[89] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 12.

[90] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 47

No intake depth information was readily available in the provided documents, but there are several instances in various documents that mention turbidity to be a problem when boats and paddle boat tours come through the area, hence, the intake may be in relatively shallow waters and close to the lake floor as described in the quote above. According to the CDPR, Boat Camp's raw water turbidity is typically less than 0.5 NTU, and it rarely exceeds 1.0 NTU. In 2019, a turbidity spike of 55 NTU was measured, and was attributed to boating vessels stirring up sediment near the intake.[91] As described below, the water treatment system is programmed to alarm and shutdown during high turbidity events, to protect system components. The raw water pump conveys Lake Tahoe water into a treatment building located approximately 500 ft inland from the boat deck.

9.3.2 Water Treatment Process

Boat Camp's 4 gpm water treatment process consists of a raw water pipeline and pump connected to the intake, pressure tank, pre-filter, 2 membrane filters (Memclear Desal DK5 thin film nanofiltrers rated for 2 gpm each), post-filter (rated for 0.020-micron to capture particulates that make it through the membranes), chlorine disinfection, treated water booster pump, pressure vessel chlorine contact tank (220 gal), three 199-gal storage tanks, and the campground treated water distribution system.[92]

The water treatment process is programmed to alarm when treated water turbidity is too high, chlorine residual is too low, or flowrate is outside specifications.[93] The alarms are designed to account for situations requiring operator attention. Critical plant alarms will perform an automatic plant shutdown.[94]

After consumption and use of drinking water, the resulting wastewater generated at Boat Camp is collected and contained in vault toilets located throughout the campground which are then "removed from the watershed via pump stations."[95] As discussed in Section 9.1.2, all

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[91] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 14

[92] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 14-18

[93] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 18-19

[94] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 19

[95] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 48

wastewater in the Tahoe region is pumped out of the region to avoid wastewater discharges into Lake Tahoe.

9.3.3 Plumbing Materials

According to several documents, the Boat Camp System does not contain leaded plumbing components. For example, "[r]eportedly, there are no lead pipes, joints, or solder used in the distribution system."[96] The plumbing components are characterized as 95% galvanized and 5% polyvinyl chloride (PVC), with a blank entry for fraction of leaded components.[97] Also, "no" is checked on a form detailing construction practices which include: "lead pipes, joints, or solder used in the distribution system."[98]

9.3.4 Available Lead Water Quality Data

According to CDPR, "Boat Campground is not required to monitor for distribution system lead and copper," nor is it required to generate annual CCRs due to its TNCWS classification.[99] Therefore, the Boat Campground System does not regularly sample for lead. The exclusion of Boat Campground System from lead sampling requirements is consistent with the LCR regulations, which, as discussed in Section 7.2 above, are applicable only to the community water systems (CWSs) and non-transient non-community water systems (NTNCWSs).

Based on available data, I understand that lead was analyzed in intake water on October 20, 1990, and was found to be <5 ppb (essentially non-detect at 5 ppb reporting level).[100]

Regarding enforcement history of the Boat Campground System, the 2020 permit states:

> "The Division [State Water Resources Control Board, Division of Drinking Water] has not taken any enforcement actions against Boat Camp during the last five years. There

[96] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 20

[97] SWRCB. 2020. Pumping Station Data form filled in handwriting. pp. 6

[98] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 51

[99] SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5. pp. 22

[100] CA Drinking Water Watch. All Sampling Results. Water System No.: CA0910305. Water System Name: CA State Parks - Emerald Bay, Boat Campg (sic). All Sampling Results. Accessed on June 14, 2024.

does not appear to be any compliance issues that would necessitate an enforcement action now."[101]

9.4 D.L. Bliss State Park

The D.L. Bliss System is solely a spring-fed stream sourced system operated by qualified employees of the California Department of Parks and Recreation (CDPR). According to the CDPR, the D.L. Bliss System is a transient non-community water system (TNCWS), and its water treatment plant is classified as a T2 water treatment facility. [102]

The water system operates year-round due to 2 residences that stay occupied in the winter.[103] These permanent residences are located at higher elevations near the water treatment plant. The remainder of the distribution system is located at lower elevations and consists of 15 campground faucet connections, and 9 comfort stations/showers.[104] This lower portion of the distribution system is depressurized for the winter to prevent pipes from freezing. In the springtime, the distribution system is disinfected before the campground is reopened.[105,106]

At the time of this report, the D.L. Bliss System has been off-line since October 27, 2023, and is planned to remain closed for the 2024 season due to the waterline replacement project.[107]

9.4.1 Intake

The D.L. Bliss drinking water system does not rely on Lake Tahoe for its source water. Instead, prior to closure for waterline replacement, the D.L. Bliss System relied on a spring-fed stream source located uphill of the D.L. Bliss Campground. The spring-fed stream has been described in various documents as:

- "…spring source which was been determined to be under the direct influence of surface water."[108]

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[101] SWRCB. 2020. Emerald Bay State Park – Boat Camp Public Water System (PWS# 0910305). Permit No. 01-09-20-PER-012. June 17. pp. 12

[102] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 5

[103] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 3

[104] Department of Health Services (DHS). 2005. Water Supply Permit No. 01-09-04-PER-010 package. pp 57

[105] Department of Health Services (DHS). 2005. Water Supply Permit No. 01-09-04-PER-010 package. pp 22

[106] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 16

[107] CDPR. 2024. D.L. Bliss Closed for the 2024 summer season. https://www.parks.ca.gov/?page_id=505 Accessed June 25, 2024.

[108] Ecologic Engineering. 2004. Engineering Report for Installation of New 30 gpm Diatomaceous Earth Water Treatment Plant. January. pp.2

- A schematic illustrating the system layout contains the following description: “Catch Basin (Spring Source).”[109]
- “…source of supply for the water system is a stream near the campground. The water is diverted from the stream and runs through [a water treatment system].”[110]
- “While Emerald Bay – D.L. Bliss State Park is a surface water treatment system, it does not source water from Lake Tahoe, but rather an open channel tributary to the lake.”[111]
- “Two small constructed ponds make up the intake. The first pond is uncovered and allows sediment to settle out. The second pond is covered with a metal grate and houses the screened intake pipe.”[112]

Based on a spreadsheet provided by the CDPR, the spring and stream diversion coordinates are 38.977582 and -120.104836,[113] illustrated on Figure 8. CDPR also provided a diagram,[114] reproduced as Figure 9, depicting the spring and stream diversion location to be substantively further to west of the spreadsheet-provided coordinates.

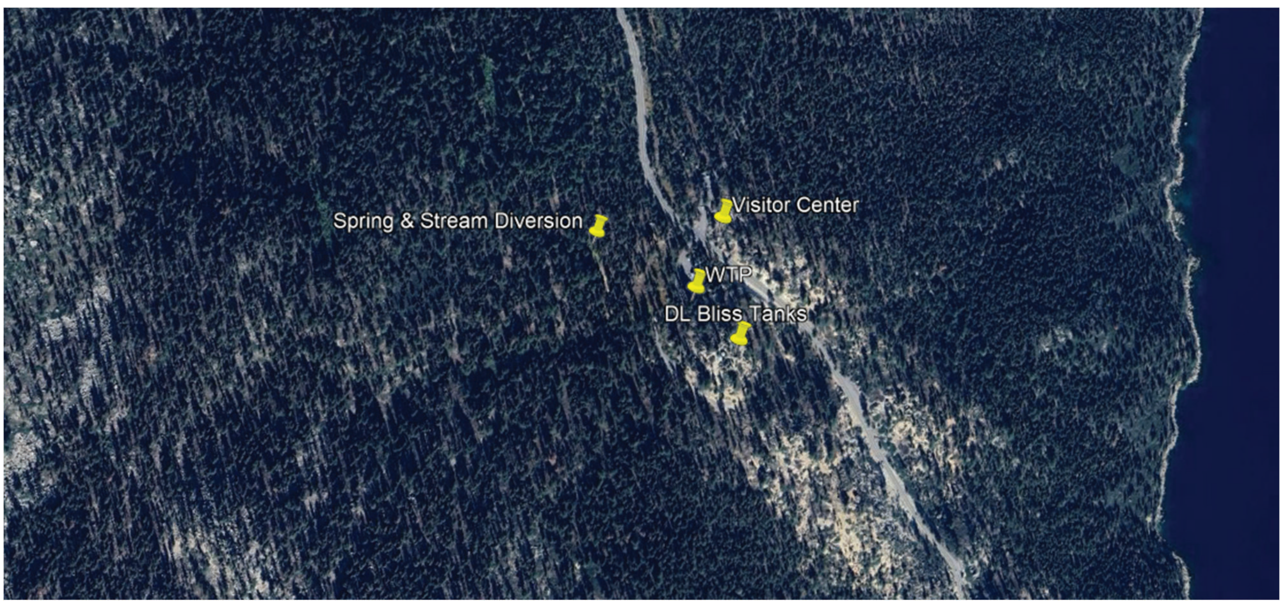

Figure 8. D.L. Bliss Spring Stream Diversion Location (based on CDPR coordinates)

[109] DHS. 2005. D.L. Bliss. DE Treatment Plant and Distribution schematic. August 4.

[110] Department of Health Services (DHS). 2005. Water Supply Permit No. 01-09-04-PER-010 package. pp. 3

[111] CDPR. 2024. Entry in CDPR-produced “Approximate GPS Coordinates of Intakes.xls” file.

[112] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 5

[113] Coordinates from CDPR-produced “Approximate GPS Coordinates of Intakes.xls” file.

[114] CDPR. 2024. The diagram was in CDPR-produced “D. L. Bliss Map.doc” file.

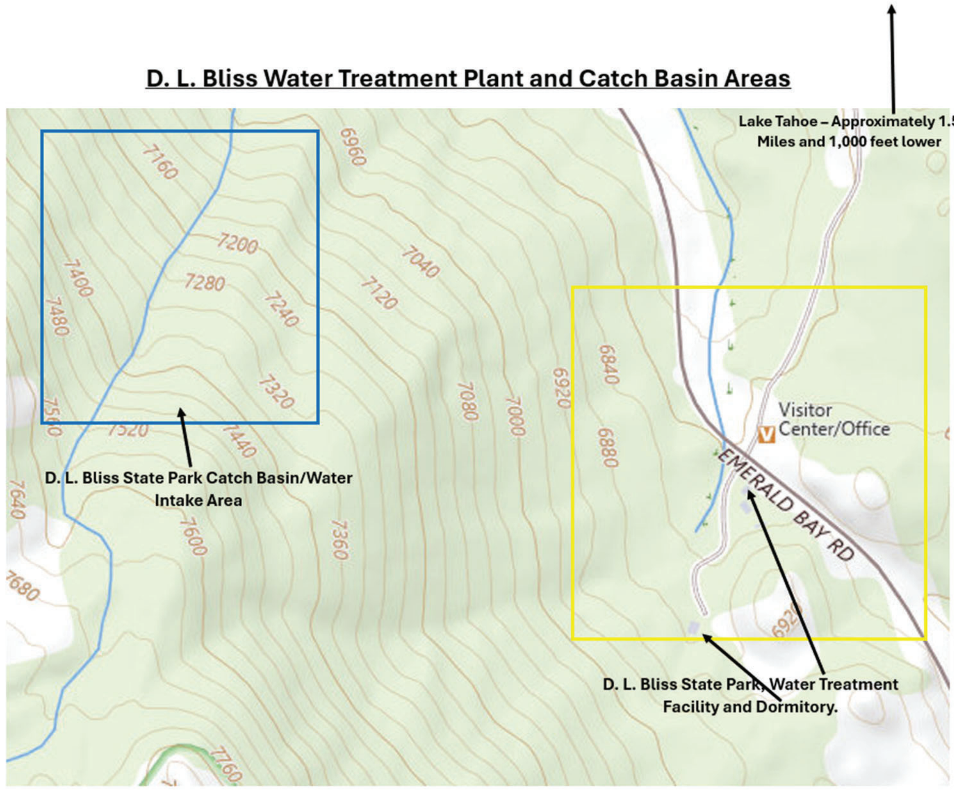

Figure 9. D.L. Bliss Spring Stream Diversion Location (CDPR's diagram)

The 2022 Compliance Inspection Report noted that a 15 gpm well was constructed to supplement the spring and stream water source.[115] The well has not been operational since its construction due to the ongoing infrastructure improvements which include replacement of piping and new storage tanks. Once the upgrades are completed, the system will require a new permit from the State Water Resources Control Board, Division of Drinking Water.[116] Based on the documents that I have reviewed, none of the reasons for implementing the D.L. Bliss System upgrades involved lead plumbing components or lead concentrations in drinking water. Instead, the upgrades were needed to address leaks resulting from high pressure experienced by the water system due to relatively high elevations of the storage tanks.[117]

Therefore, the descriptions below summarize the water treatment process and distribution system prior to the ongoing infrastructure improvements.

[115] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 5

[116] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 2, 4

[117] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 10

9.4.2 Water Treatment Process

The CDPR notes that the water treatment process at D.L. Bliss is similar to the process described for Eagle Point, with the exception of D.L. Bliss currently having a lower treatment capacity (30 gpm vs. Eagle Point's 60 gpm).[118] D.L. Bliss' 30 gpm WTP process consists of filtration and chlorination. Specifically, a Schneider Model 85 DE treatment plant contains a strainer, chlorine injection system, DE filter stack, recirculation pumps, associated tanks, and a 1.500-gal clearwell.[119] The DE filtration system is self-contained and semi-automated; it monitors influent and effluent turbidity and has a number of alarms and fail-safe regimes to assure proper operation by preventing turbid water being served to consumers.[120]

After consumption and use of drinking water, the resulting wastewater generated at D.L. Bliss is routed via sewer mains to the Tahoe-Truckee Sanitary Agency for treatment via the Tahoe City Public Utility District Main Trunk Line.[121,122] During particularly dry years when spring flow is reduced, the CDPR closes permanent restrooms and instead relies on portable toilet facilities for sewage management.[123]

9.4.3 Plumbing Materials

According to CDPR, the D.L. Bliss System does not contain leaded plumbing components. For example, "no" is checked on a form detailing construction practices which include: "lead pipes, joints, or solder used in the distribution system,"[124] and zero is entered for lead in a "service connections" field.[125] D.L. Bliss' existing plumbing components have been characterized as 60% asbestos cement, 25% plastic (PVC and high density polyethylene [HDPE]), and 15% galvanized iron.[126] Replacement piping material currently being installed is C900 pipe,[127] a blue plastic polymer pipe suitable for drinking water applications. Along with the C900 pipe installation, two new 2,500-gal HDPE tanks were installed for raw water storage.[128]

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118 CDPR. 2019. Eagle Point Campground Daily Waterplant Operations Manual. June. pp. 8

119 SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp. 6

120 Schneider Co. 1996. Model 85 Filter System Manual. pp. 9

121 CDPR. 2023. Sewer System Management Plan for DL Bliss. pp. 11

122 California Integrated Water Quality System (CIWQS). 2023. DL Bliss Sanitary Sewer Systems General Order Questionnaire. February 14. pp. 3

123 SWRCB. 2014. 2014 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 2

124 SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 9

125 Department of Health Services (DHS). 2005. Water Supply Permit No. 01-09-04-PER-010 package. pp 22

126 SWRCB. 2024. 2023 Electronic Annual Report DL Bliss. March 7. pp 16

127 SWRCB. 2024. 2023 Electronic Annual Report DL Bliss. March 7. pp 16

128 SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 3

9.4.4 Available Lead Water Quality Data

According to CDPR, "D.L. Bliss is not required to monitor for distribution system lead and copper," nor is it required to generate annual CCRs due to its TNCWS classification.[129] Therefore, the D.L. Bliss System does not regularly sample for lead. The exclusion of the D.L. Bliss System from lead sampling requirements is consistent with the LCR regulations, which, as discussed in Section 7.2 above, are applicable only to the community water systems (CWSs) and non-transient non-community water systems (NTNCWSs).

Based on available data, I understand that lead was analyzed in D.L. Bliss' intake water on October 20, 1990, and was found to be <5 ppb (essentially non-detect at 5 ppb reporting level).[130]

According to the 2022 permit, the D.L. Bliss System has not had enforcement actions against it since 2004.[131]

9.5 Camp Richardson

The Camp Richardson System is solely a groundwater-sourced system administered by the United States Forest Service – Lake Tahoe Basin Management Unit (LTBMU).[132] This system is classified as a D1 (i.e., serves a population of 1,000 or less[133]) non-transient non-community water system (NTNCWS) that includes 200 connections.[134] The Camp Richardson System is also known as the South Shore Recreation Area System, and it serves Camp Richardson, Tallac Historic Site, and the Fallen Leaf Campground.[135]

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[129] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 13

[130] CA Drinking Water Watch. All Sampling Results. Water System No.: CA0910301. Water System Name: CA State Parks - D.L. Bliss. All Sampling Results. Accessed on June 14, 2024.

[131] SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301). pp 3

[132] CA Drinking Water Watch. Water System Details. Water System No.: CA0900649. Water System Name: South Shore Recreation Area. https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=8548&tinwsys_st_code=CA&counter=0. Accessed on June 13, 2023.

[133] Cal. Code Regs. tit. 22 § 64413.3 https://casetext.com/regulation/california-code-of-regulations/title-22-social-security/division-4-environmental-health/chapter-15-domestic-water-quality-and-monitoring-regulations/article-2-general-requirements/section-644133-classification-of-distribution-systems

[134] CA Drinking Water Watch. Water System Details. Water System No.: CA0900649. Water System Name: South Shore Recreation Area. https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=8548&tinwsys_st_code=CA&counter=0. Accessed on June 13, 2023.

[135] Personal communications with Michael Alexander (USFS). June 24, 2024.

Water for the Camp Richardson System is sourced from a single well: Well 1 (also known as the Tallac Well).[136] The screen depths for Well 1 (Tallac Well) are between 120 ft below ground surface (bgs) and 210 ft bgs.[137] The Camp Richardson water treatment process consists of chlorine addition.[138] Past violations reported for the Camp Richardson System in the State Water Board's Safe Drinking Water Information System (SDWIS) database include Maximum Contaminant Level (MCL)[139] violations for *E. coli* and total coliform (in 2008, 2014, 2015, and 2023), as well as routine monitoring requirement violations for total coliform (2006, 2013, 2015), and nitrite (2013).[140] According to Camp Richardson's 2023 Consumer Confidence Report (CCR), chlorine was dosed into the water storage tank and flushed throughout the distribution system to address the 2023 *E. coli* MCL violation.[141] No LCR-related violations were reported in the 2023 CCR.[142]

Based on the available data, lead in treated drinking water was last sampled at Camp Richardson on September 30, 2023, and was reported at 4.3 ppb (90^{th} %-ile result, n = 10) with zero sites exceeding the EPA's Action Level for lead (15 ppb).[143] Before 2023, lead was last sampled in 2020, 2017, and 2014 with zero sites exceeding the EPA's Action Level for lead.[144,145,146] Source groundwater in Well 1 (Tallac Well) has been analyzed for lead in 2013, 2019, and

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136 South Shore Recreation Area. 2023 CCR. Accessed on June 13, 2024.

137 CA Water Boards. GAMA Groundwater Information System. CA0900649_001_001. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600900649&assigned_name=CA0900649%5F001%5F001&store_num=. Accessed on June 17, 2024.

138 Personal communications with Michael Alexander (USFS). June 24, 2024.

139 MCLs are the highest concentrations of contaminants that are allowed in drinking water. MCLs are enforceable standards.

140 CA Drinking Water Watch. Violations. Water System No.: CA0900649. Water System Name: South Shore Recreation Area. https://sdwis.waterboards.ca.gov/PDWW/JSP/Violations.jsp?tinwsys_is_number=8548&tinwsys_st_code=CA. Accessed on June 13, 2024.

141 South Shore Recreation Area. 2023 CCR. Accessed on June 13, 2024.

142 *Ibid.*

143 *Ibid.*

144 South Shore Recreation Area. 2021 CCR. Accessed on June 13, 2024.

145 South Shore Recreation Area. 2018 CCR. Accessed on June 13, 2024.

146 CA Drinking Water Watch. Water System Details. Water System No.: CA0900649. Water System Name: South Shore Recreation Area. https://sdwis.waterboards.ca.gov/PDWW/JSP/LeadAndCopperSampleSummaryResults.jsp?tinwsys_is_number=8548&tinwsys_st_code=CA&begin_date=&end_date=&counter=0 Accessed on June 13, 2024.

2022, with results indicating lead concentrations are below the reporting limits of <1 and <5 ppb.[147]

9.6 Baldwin Beach System

The Baldwin Beach System is solely a groundwater-sourced system administered by Vista Recreation, a concessioner working on behalf of the United States Forest Service LTBMU.[148] This system is classified as a transient non-community water system (TNCWS) that seasonally serves a population of approximately 200 people between May and October.[149]

Water for the Baldwin Beach System is sourced from a single well: Well 01,[150] screened between 70 and 100 ft bgs.[151] Reportedly, the well water is not chlorinated,[152] and the distribution system serves flushing toilets.[153] Baldwin Beach is a day-use area designated for picnicking and beach activities; there is no overnight camping infrastructure that would necessitate a drinking water supply. According to the USFS, there are no drinking water amenities at Baldwin Beach, only flush-type toilets,[154] but Vista Recreation indicated that spigots are present.[155]

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147 CA Water Boards. GAMA Groundwater Information System. CA0900649_001_001. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600900649&assigned_name=CA0900649%5F001%5F001&store_num=. Accessed on June 13, 2024.

148 Personal communications with Michael Alexander (USFS). June 24, 2024.

149 CA Drinking Water Watch. Water System Details. Water System No.: CA0900654. Water System Name: Baldwin Beach. https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=8553&tinwsys_st_code=CA&counter=0. Accessed on June 13, 2024.

150 *Ibid.*

151 CA Water Boards. GAMA Groundwater Information System. CA0900654_001_001. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600900654&assigned_name=CA0900654%5F001%5F001&store_num=. Accessed on June 17, 2024.

152 Personal communications with Charlie and Tina Westerhold (Vista Recreation). June 26, 2024.

153 Personal communications with Michael Alexander (USFS). June 24, 2024.

154 USFS. 2024. Baldwin Beach at a Glance. https://www.fs.usda.gov/recarea/ltbmu/recarea/?recid=11778 Accessed on June 24, 2024.

155 Personal communications with Charlie and Tina Westerhold (Vista Recreation). June 26, 2024.

Since the Baldwin Beach System is a TNCWS, its reporting requirements are limited: no CCRs are available on the State Water Boards SDWIS database, and no lead data is available; the only analytes reported are nitrate and nitrate (2011 to 2023).[156]

9.7 Cascade Mutual Water Company

The Cascade Mutual Water Company System is solely a groundwater-sourced system. This system is classified as a transient non-community water system (TNCWS) that includes 33 connections located roughly between Tallac Creek and Cascade Creek, abutting the Emerald Bay State Park to the north (Figure 1).[157,158] According to the State Water Board, the population served by the Cascade Mutual Water Company System includes 2 residential locations (for example, residential type locations include residential area, mobile home park, municipality) and 60 transient locations (for example, recreation area, highway rest area, hotel/motel).[159,160]

Water for the Cascade Mutual Water Company System is sourced from one well: Well 1. The screen depths for Well 1 were not reported.[161] Since the Cascade Mutual Water Company System is a TNCWS, its reporting requirements are limited: no CCRs are available on the State

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[156] CA Drinking Water Watch. Water System Details. Water System No.: CA0900654. Water System Name: Baldwin Beach. https://sdwis.waterboards.ca.gov/PDWW/JSP/NMonitoringSchedules.jsp?tinwsys_is_number=8553&tinwsys_st_code=CA&ReportFormat=SR Accessed on June 13, 2024.

[157] CA Drinking Water Watch. Water System Details. Water System No.: CA0900523. Water System Name: Cascade Mutual Water Company. https://sdwis.waterboards.ca.gov/PDWW/JSP/AllPbCuResults.jsp?tinwsys_is_number=8514&tinwsys_st_code=CA&Chem=25. Accessed on June 13, 2024.

[158] Tahoe Regional Planning Agency. Tahoe Open Data. Water service area boundaries. https://www.tahoeopendata.org/datasets/TRPA::water-service-area-boundaries/explore?location=38.945764%2C-120.077437%2C16.00. Accessed on June 17, 2024.

[159] CA Drinking Water Watch. Water System Details. Water System No.: CA0900523. Water System Name: Cascade Mutual Water Company. https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=8514&tinwsys_st_code=CA&counter=0. Accessed on June 13, 2024.

[160] California State Water Boards. Population Type. https://sdwis.waterboards.ca.gov/PDWW/Help/html_Population_Type.htm

[161] Well 1 depth values were reported as "0" by GAMA GIS; Exponent suspects this indicates that the well depth and screen interval are unknown. CA Water Boards. GAMA Groundwater Information System. CA0900523_001_001. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600900523&assigned_name=CA0900523%5F001%5F001&store_num=. Accessed on June 13, 2024.

Water Board's SDWIS database, and no lead data are available; analytes reported include iron, magnesium, manganese, nitrate, nitrite, sodium, calcium, carbonate, etc. (2008 to 2023).[162]

The Cascade Mutual Water Company System water is not treated unless there is a total coliform MCL violation which then results in water chlorination.[163] Past violations reported for the Cascade Mutual Water Company System in the SDWIS database include MCL violations for total coliform, as well as routine monitoring requirement violations for total coliform, nitrate, and nitrite spanning from 1995 to 2014.[164]

9.8 Rubicon System

The Rubicon System is solely a groundwater-sourced system administered by the Tahoe City Public Utility District (TCPUD). This system is classified as a D1 community water system (CWS) that includes 627 connections[165] between D.L. Bliss State Park to the south and the community of Meeks Bay to the north.[166] Lead-clad Cable B terminates in the Rubicon System service area (Figure 1).

Water for the Rubicon System is sourced from three wells: Rubicon Well #1 (Silvertip), Rubicon Well #2 (Lakeview), and Rubicon Well #3 (Ridge).[167] Rubicon Well #1 is screened

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[162] CA Drinking Water Watch. Monitoring Results for Individual Sampling Points. Water System No.: CA0900523. Water System Name: Cascade Mutual Water Company. https://sdwis.waterboards.ca.gov/PDWW/JSP/NMonitoringSchedules.jsp?tinwsys_is_number=8514&tinwsys_st_code=CA&ReportFormat=SR. Accessed on June 13, 2024.

[163] Personal communications with John Maxhimer (Cascade Mutual Water Company). July 1, 2024.

[164] CA Drinking Water Watch. Violations. Water System No.: CA0900523. Water System Name: Cascade Mutual Water Company. https://sdwis.waterboards.ca.gov/PDWW/JSP/Violations.jsp?tinwsys_is_number=8514&tinwsys_st_code=CA. Accessed on June 13, 2024.

[165] Tahoe Regional Planning Agency. Tahoe Open Data. Water service area boundaries. https://www.tahoeopendata.org/datasets/TRPA::tahoe-planning-and-jurisdiction-layers/explore?layer=20&location=39.012674%2C-120.104345%2C14.00&showTable=true. Accessed on June 17, 2024.

[166] TCPUD. 2023 CCR. Accessed on June 13, 2024.

[167] CA Drinking Water Watch. Water System Details. Water System No.: CA0910012. Water System Name: Tahoe City PUD - Rubicon. https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=295&tinwsys_st_code=CA Accessed on June 14, 2024.

between 200 and 420 ft bgs,[168] Rubicon Well #2 between 190 and 320 ft bgs,[169] and Rubicon Well #3 between 158 and 298 ft bgs.[170] Based on available documentation, the treatment processes utilized in treating the Rubicon System groundwater are unknown, but TCPUD states that the water is chlorinated.[171] According to TCPUD's 2023 CCR, all of TCPUD's water systems, including the Rubicon System, "met all USEPA and State drinking water health standards."[172] The only past violation reported for the Rubicon System in the SDWIS database is a primary MCL violation for manganese in November 1990.[173]

Lead and Copper Rule (LCR) monitoring is performed by TCPUD every three years. TCPUD aims to perform the LCR monitoring at homes built between 1982 to 1986 which "have a higher likelihood of having internal plumbing consisting of copper pipes that were joined using lead containing solder."[174] Based on the available information, lead was last sampled at individual residences[175] within the Rubicon System in 2021 and was reported at 7.8 ppb (90th %-ile result, n = 10) with zero sites exceeding the EPA's Action Level for lead (15 ppb),[176] with individual samples ranging between non-detect (reported at zero) to 12 ppb lead. Other recent Rubicon System lead 90th %-ile results (n = 10) were 8.3 ppb in 2012, 4.6 ppb in 2015, and 2.4 ppb in 2018.[177]

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[168] CA Water Boards. GAMA Groundwater Information System. CA0910012-003-003 https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600910012&assigned_name=CA0910012%5F003%5F003&store_num= Accessed on June 13, 2024.

[169] CA Water Boards. GAMA Groundwater Information System. CA0910012. CA0910012-004-004 https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600910012&assigned_name=CA0910012_004_004&store_num= Accessed on June 13, 2024.

[170] CA Water Boards. GAMA Groundwater Information System. CA0910012. CA0910012-006-006 https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600910012&assigned_name=CA0910012_006_006&store_num= Accessed on June 13, 2024.

[171] TCPUD. 2023. CCR for Tahoe City. https://www.tcpud.org/sites/default/files/TCPUD%20CCR%202023%20Final%205-28-24%20(Added%20UCMR5%20results%20and%20PN)_0.pdf Accessed on June 13, 2024.

[172] *Ibid.*

[173] CA Drinking Water Watch. Violations. Water System No.: CA0910012. Water System Name: Tahoe City PUD - Rubicon. https://sdwis.waterboards.ca.gov/PDWW/JSP/Violations.jsp?tinwsys_is_number=295&tinwsys_st_code=CA Accessed on June 15, 2024.

[174] TCPUD. FAQ. Water Quality and Safety. https://www.tcpud.org/faq. Accessed on June 13, 2024.

[175] TCPUD. FAQ. Water Quality and Safety. https://www.tcpud.org/faq. Accessed on June 13, 2024.

[176] TCPUD. 2023 CCR. Accessed on June 13, 2024.

[177] CA Drinking Water Watch. Lead and Copper Sample Summary Results. Water System No.: CA0910012. Water System Name: Tahoe City PUD - Rubicon.

TCPUD states that it is "not aware of any lead service pipes in [its] water system or in [its] customers pipes and the amount of lead containing solder used to join copper pipes in [its] area's households is very low."[178]

Source groundwater lead concentrations in Rubicon Wells #1 and #2 were analyzed for lead in 1990, 1993, 1999 and 2023, and Well #3 in 2000 and 2023, with results indicating lead concentrations below the reporting limits (<1 ppb and <5 ppb, depending on the year). [179,180,181]

Based on the available lead concentration data, the Rubicon drinking water system met the 15 ppb lead AL drinking water standard for its source groundwater and the treated drinking water.

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https://sdwis.waterboards.ca.gov/PDWW/JSP/LeadAndCopperSampleSummaryResults.jsp?tinwsys_is_number=295&tinwsys_st_code=CA&begin_date=&end_date=&counter=0 Accessed on June 13, 2024.

178 TCPUD. FAQ. Water Quality and Safety. https://www.tcpud.org/faq. Accessed on June 13, 2024.

179 CA Water Boards. GAMA Groundwater Information System. CA0910012_003_003. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600910012&assigned_name=CA0910012%5F003%5F003&store_num=. Accessed on June 13, 2024.

180 CA Water Boards. GAMA Groundwater Information System. CA0910012_004_004. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600910012&assigned_name=CA0910012%5F004%5F004&store_num=. Accessed on June 13, 2024.

181 CA Water Boards. GAMA Groundwater Information System. CA0910012. CA0910012-006-006 https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600910012&assigned_name=CA0910012_006_006&store_num= Accessed on June 13, 2024.

10 Lead Concentrations in Drinking Water Systems

10.1 Lead Data Compilation

Table 1 is a compilation of lead concentration data for the eight drinking water treatment systems within the established geographic extent discussed in Section 9. Data sources used for this table include: the 2023 data for Eagle Point System analyzed by Cranmer Engineering & Analytical Laboratory at the request of the CDPR,[182,183] as well as the Groundwater Ambient Monitoring and Assessment (GAMA) program[184] and the Safe Drinking Water Information System (SDWIS)[185] databases, both administered by the California State Water Resources Control Board. The table is organized from south to north, starting with source water information, followed by 90th %-ile lead concentrations in treated drinking water (reported by systems that are required to sample for lead as part of their LCR compliance), and, where available, lead concentrations for individual drinking water samples (which are then used for the 90th %-ile calculations). Note that the compiled dataset may not be exhaustive with respect to water lead data; none of the publicly available data found for this report was excluded. Some of the results were reported as being lower than method detection limits (MDL) or method reporting limits (RL) (these are indicated by the less-than sign "<"), while others were reported as zero (Table 1). Based on the available information, I was not able to determine the MDL or RL for the samples reported as zero.

[182] Cranmer Engineering Inc. 2003. Eagle Point Intake Laboratory Report, dated June 5, 2023.

[183] Cranmer Engineering Inc. 2023. Eagle Point Distribution Laboratory Report, dated June 15, 2023.

[184] https://www.waterboards.ca.gov/gama/online_tools.html

[185] https://sdwis.waterboards.ca.gov/PDWW/

Table 1. Lead Concentrations in Drinking Water Systems within Geographic Extent

System Name	Source Water	Sample Location	Date	Lead Conc. (ppb)
Camp Richardson	GW	Well 1	12/16/2013	<5
Camp Richardson	GW	Well 1	6/19/2019	<5
Camp Richardson	GW	Well 1	11/17/2022	<1
Camp Richardson	GW	LCR 90th%-ile, n=10	12/9/2014	4.27
Camp Richardson	GW	LCR 90th%-ile, n=10	9/28/2017	1.8
Camp Richardson	GW	LCR 90th%-ile, n=10	9/16/2020	6.8
Camp Richardson	GW	LCR 90th%-ile, n=10	9/30/2023	4.3
Camp Richardson	GW	Drinking Water	9/30/2023	0
Camp Richardson	GW	Drinking Water	9/30/2023	5.8
Camp Richardson	GW	Drinking Water	9/30/2023	0
Camp Richardson	GW	Drinking Water	9/30/2023	1.2
Camp Richardson	GW	Drinking Water	9/30/2023	1.3
Camp Richardson	GW	Drinking Water	9/30/2023	1.1
Camp Richardson	GW	Drinking Water	9/30/2023	0
Camp Richardson	GW	Drinking Water	9/30/2023	0
Camp Richardson	GW	Drinking Water	9/30/2023	4.3
Camp Richardson	GW	Drinking Water	9/30/2023	4.2
Baldwin Beach	GW	--	--	--
Cascade Mutual	GW	--	--	--
Eagle Point	Lake	Intake - Lake Tahoe	10/20/1990	<5
Eagle Point	Lake	Intake - Lake Tahoe	6/1/2023	<0.5
Eagle Point	Lake	Distribution System	6/13/2023	0.602
Vikingsholm	Lake	Intake - Lake Tahoe	10/20/1990	<5
Boat Campground	Lake	Intake - Lake Tahoe	10/20/1990	<5
D.L. Bliss	Spring & Stream	Intake - Spring/Stream	10/20/1990	<5
Rubicon	GW	Rubicon Well #1 (Silvertip)	4/16/1990	<1
Rubicon	GW	Rubicon Well #1 (Silvertip)	6/8/1993	<1
Rubicon	GW	Rubicon Well #1 (Silvertip)	6/14/1999	<5
Rubicon	GW	Rubicon Well #1 (Silvertip)	11/30/2023	<1
Rubicon	GW	Rubicon Well #2 (Lakeview)	4/16/1990	<1
Rubicon	GW	Rubicon Well #2 (Lakeview)	6/8/1993	<1
Rubicon	GW	Rubicon Well #2 (Lakeview)	6/14/1999	<5
Rubicon	GW	Rubicon Well #2 (Lakeview)	11/8/2023	<1
Rubicon	GW	Rubicon Well #3 (Ridge)	6/9/2000	<1
Rubicon	GW	Rubicon Well #3 (Ridge)	11/8/2023	<1
Rubicon	GW	LCR 90th%-ile, n=25	9/1/1993	9.2

System Name	Source Water	Sample Location	Date	Lead Conc. (ppb)
Rubicon	GW	LCR 90th%-ile, n=7	10/18/2004	8.4
Rubicon	GW	LCR 90th%-ile, n=20	9/10/2007	9.6
Rubicon	GW	LCR 90th%-ile, n=11	1/25/2008	4.5
Rubicon	GW	LCR 90th%-ile, n=10	9/3/2009	10.5
Rubicon	GW	LCR 90th%-ile, n=10	6/29/2012	8.3
Rubicon	GW	LCR 90th%-ile, n=10	8/25/2015	4.6
Rubicon	GW	LCR 90th%-ile, n=10	8/4/2018	2.4
Rubicon	GW	LCR 90th%-ile, n=10	6/3/2021	7.8
Rubicon	GW	Drinking Water	6/6/2021	0
Rubicon	GW	Drinking Water	6/4/2021	1.2
Rubicon	GW	Drinking Water	6/3/2021	12
Rubicon	GW	Drinking Water	6/9/2021	0
Rubicon	GW	Drinking Water	6/16/2021	0
Rubicon	GW	Drinking Water	8/20/2021	7.8

10.2 Lead Data Interpretation

The data in Table 1 was plotted on Figure 10 to visually represent the lead concentrations in drinking water systems located within the geographic extent of this evaluation. In Figure 10, symbols (e.g., squares and circles) represent lead concentrations that were quantified above MDLs or RLs, while dashes represent results that did not detect any lead above the analytical detection limit stated (i.e., below MDLs or RLs). A vertical line emanates below each dash to the x-axis to indicate that true lead concentration falls somewhere in the range between zero ppm and the MDL or RL. As described above, certain results were reported as zero in the GAMA and/or SDWIS databases, and these were plotted as zeroes on Figure 10.

In Figure 10, squares represent groundwater data and circles surface water data (e.g., Lake Tahoe water). Since all source water data, whether groundwater or Lake Tahoe, was below the MDL or RL, it is represented as dashes in Figure 10. The 90th %-ile data is identified by hashed symbols, and individual water samples by filled in symbols. Gray is used for the Camp Richardson System and blue for the Rubicon System. The 1990 Lake Tahoe lead intake data for the Eagle Point, Vikingsholm, and Boat Camp Systems is depicted as a red dash to differentiate it from other data, and to indicate that this single red dash represents a non-detect result (<5 ppb) for each of these intake samples. The red dash also represents a non-detect result (<5 ppb) for the D.L. Bliss intake which, as described in Section 9.4, relies on a spring-fed stream. The 2023 Eagle Point data is depicted as a green dash (for non-detect) and a green circle for the detected value, in the lower right portion of Figure 10. The red line indicates EPA's 15 ppb lead Action Level (90th %-ile).

All lead data from source waters and drinking water systems located within 2 miles of the lead-clad cables compiled in this dataset meets the EPA's 15 ppb lead Action Level; there has not been a single excursion above the Action Level (Figure 10).

10.2.1 Lead Concentrations in Drinking Water Systems within Geographic Extent

Figure 10 shows that source water samples were all non-detect for lead at their respective MDLs or RLs. The Eagle Point 2023 intake lead concentration was reported as <0.5 ppb, while the Camp Richardson well measured <5 ppb (in 2013 and 2019) and <1 ppb (in 2022), and the Rubicon wells <1 ppb, with a single <5 ppb result in 1999 (Figure 10). Based on the available data, the MDLs and RLs were historically higher (<5 and <1 ppb), but greater sensitivity can be achieved, such as the <0.5 ppb RL achieved during CDPR's June 2023 sampling of Eagle Point's intake and treated water (green bar overlaying green circle on Figure 10).

Figure 10 illustrates the relatively low concentration of Eagle Point's drinking water lead concentration (0.602 ppb green circle) among the distribution of individual and 90th %-ile water samples from the groundwater-sourced Camp Richardson and the Rubicon systems, and its relation to the 15 ppb Action Level.

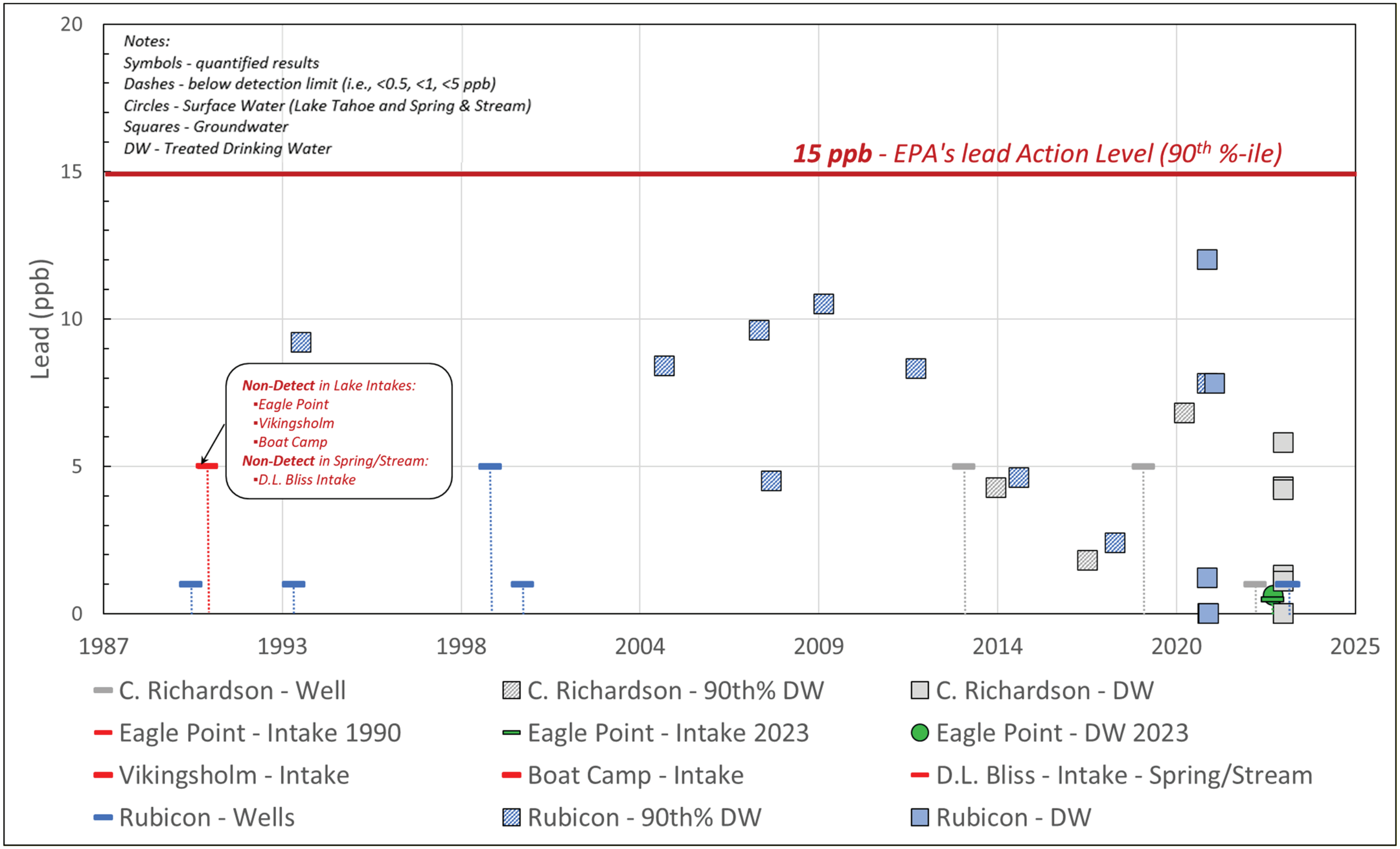

Figure 10. Lead Concentrations in Drinking Water Systems within Geographic Extent

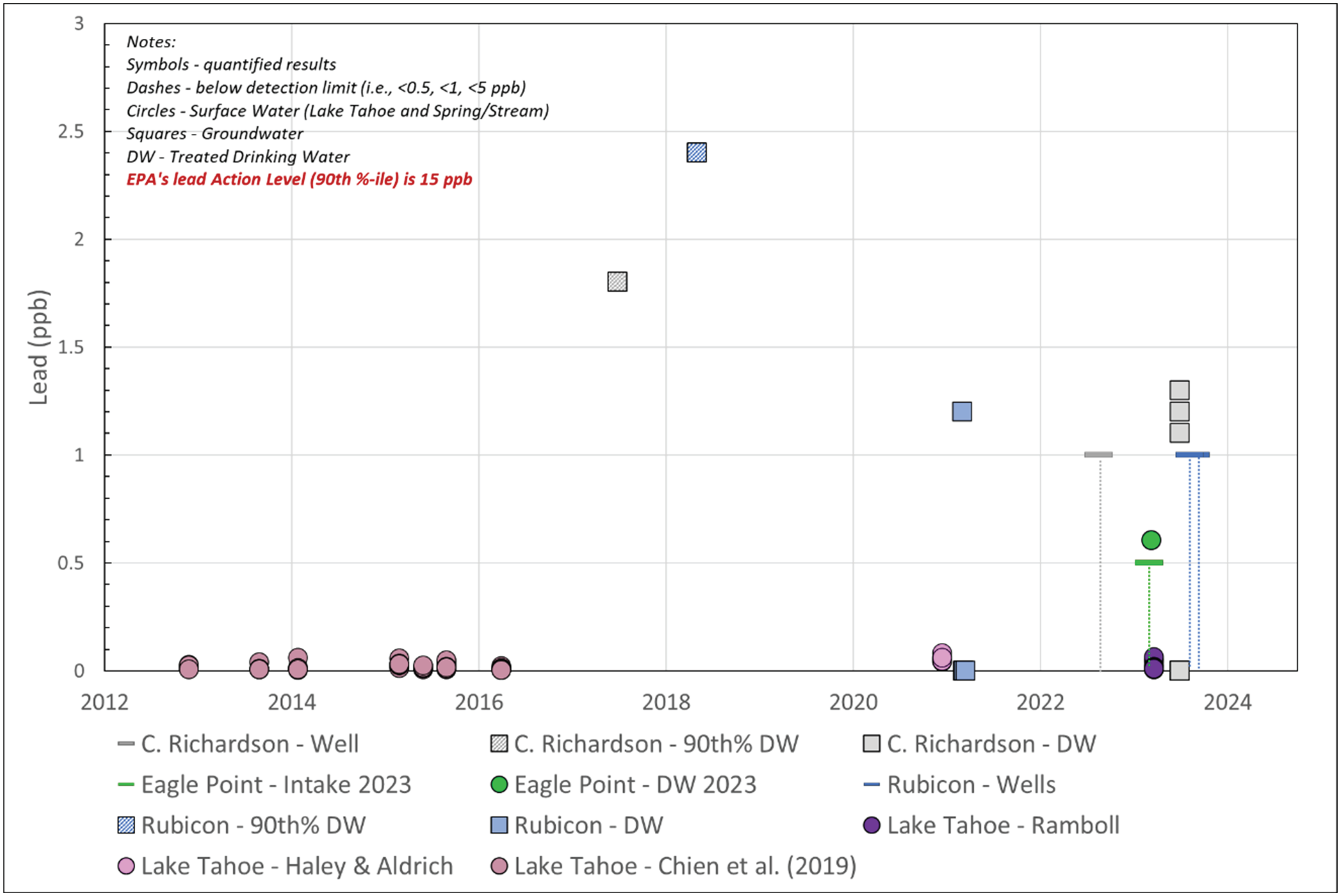

Figure 11. Zoomed-In Version of Figure 10 Focusing on Lead Concentrations <3 ppb with Lake Tahoe Data

10.2.2 Comparison of Eagle Point's 2023 Lead Data with Lake Tahoe Data

Figure 11 is a zoomed-in version of Figure 10, focusing on lead concentrations less than 3 ppb spanning from 2012 to 2024. Within this figure extent, the Eagle Point intake non-detect (<0.5 ppb) result and the treated drinking water result (0.602 ppb) appear in green on the right of Figure 11. In addition, this magnified scale enables a comparison to the Lake Tahoe water lead data sampled by Ramboll,[186] Haley & Aldrich,[187] and Chien et al. (2019),[188] all of which was measured at relatively low "trace" detection levels of <0.006 ppb (purple), <0.043 ppb (pink), and <0.000207 ppb (burgundy),[189] respectively.

Water samples collected by Ramboll in 2023 and Haley & Aldrich in 2021 were primarily in proximity to the lead-clad cables, with several reference locations further away.[190] The objective of the Chien et al. (2019) study did not focus on the lead-clad cables, but instead concentrated on assessing impacts of atmospheric dry deposition on metal and nutrient inventories in Lake Tahoe. Water samples in Chien et al. (2019) were collected from the Mid-Lake Tahoe Profile station located at 39.09231° N, 120.00275° W.

Figure 11 is a visual comparison of Eagle Point's 2023 intake and treated water lead data with the Lake Tahoe water lead data sampled by Ramboll, Haley & Aldrich, and Chien et al. (2019).[191] Figure 11 visually communicates the substantial ~5-fold difference in concentrations between the Lake Tahoe raw water samples (both in proximity and away from the lead-clad cables) and the treated water sample collected from the Eagle Point System in June 2023. As discussed above, the 2023 intake water sample was analyzed at an RL of <0.5 ppb, so its exact concentration cannot be determined below the RL, but overall, the Eagle Point intake data is consistent with the Lake Tahoe water lead data collected by Ramboll, Haley & Aldrich, and Chien et al. (2019).

10.2.3 Lead Contributions from Plumbing Components to Drinking Water

The data in Figure 10 and Figure 11 displays a pattern of lower lead concentrations in environmental waters (Lake Tahoe water and groundwater) and higher concentrations in treated

[186] Ramboll. 2023. Lake Tahoe Water Lead Study. Lake Tahoe, California.

[187] Haley & Aldrich. 2024. Supplemental Report on Lake Tahoe Field Sampling and Analysis of Impacts of Legacy Telecommunication Cables on Water Quality. South Lake Tahoe, California.

[188] Chien, et al. 2019. Evaluation of atmospheric dry deposition as a source of nutrients and trace metals to Lake Tahoe. Chemical Geology, 511, 178-189.

[189] Chien et al. 2019 reported a trace element blank result of 0.001 nmol kg^{-1} for lead (Table S2), which is equivalent to 0.000207 ppb of lead.

[190] Refer to the original Ramboll and Haley & Aldrich reports for specifics.

[191] Figure 11 also depicts the Camp Richardson and the Rubicon drinking water values reported as zeroes.

drinking waters. This pattern is consistent with the accepted state of knowledge as summarized in Section 7, whereby corrosion of plumbing components, even those deemed “lead-free,” to be contributing lead to drinking water. In the case of the water systems evaluated herein, none of these lead contributions exceed the EPA’s 15 ppb lead Action Level.

10.3 Water Treatment Processes Overview and Summary

In summary, I identified 8 water treatment systems located within 2 miles of the lead-clad cables and along the shore of Lake Tahoe. Three of these systems (Eagle Point, Vikingsholm, and Boat Campground) are reliant on Lake Tahoe water that is drawn from Emerald Bay, four systems (Camp Richardson, Baldwin Beach, Cascade Mutual, Rubicon) are reliant on groundwater, and lastly a single system (D.L. Bliss) is reliant on a spring stream diversion. Based on reviewed documentation, Eagle Point, Vikingsholm, Boat Campground, and D.L. Bliss were characterized as being “lead-free” systems.

The 2023 sampling conducted by the CDPR indicated that Eagle Point System intake, which among the potable water systems is located closest to the lead-clad cables (Figure 12), contained a non-detectable level of lead (<0.5 ppb), and that after treatment through the Eagle Point water treatment process, the lead concentration was 0.602 ppb. Both of these Eagle Point System samples from 2023 were substantially lower than the EPA’s 15 ppb lead Action Level.

These Eagle Point results were also consistent with the intake sampling conducted at Eagle Point, Vikingsholm, and Boat Campground in 1990, where lead concentrations were non-detect (<5 ppb). Based on their size and service population, all 3 surface-water-sourced systems (Eagle Point, Vikingsholm, and Boat Campground) are classified as transient non-community water systems (TNCWS), which does not require periodic lead sampling of their treated drinking waters (see Sections 7 and 9). Nonetheless, based on the 2023 Eagle Point data, and Lake Tahoe data collected by Ramboll in 2023, Haley & Aldrich in 2021, and Chien et al. in 2013-2016, the surface water systems are supplied with *raw* water that meets the *drinking* water lead standard.

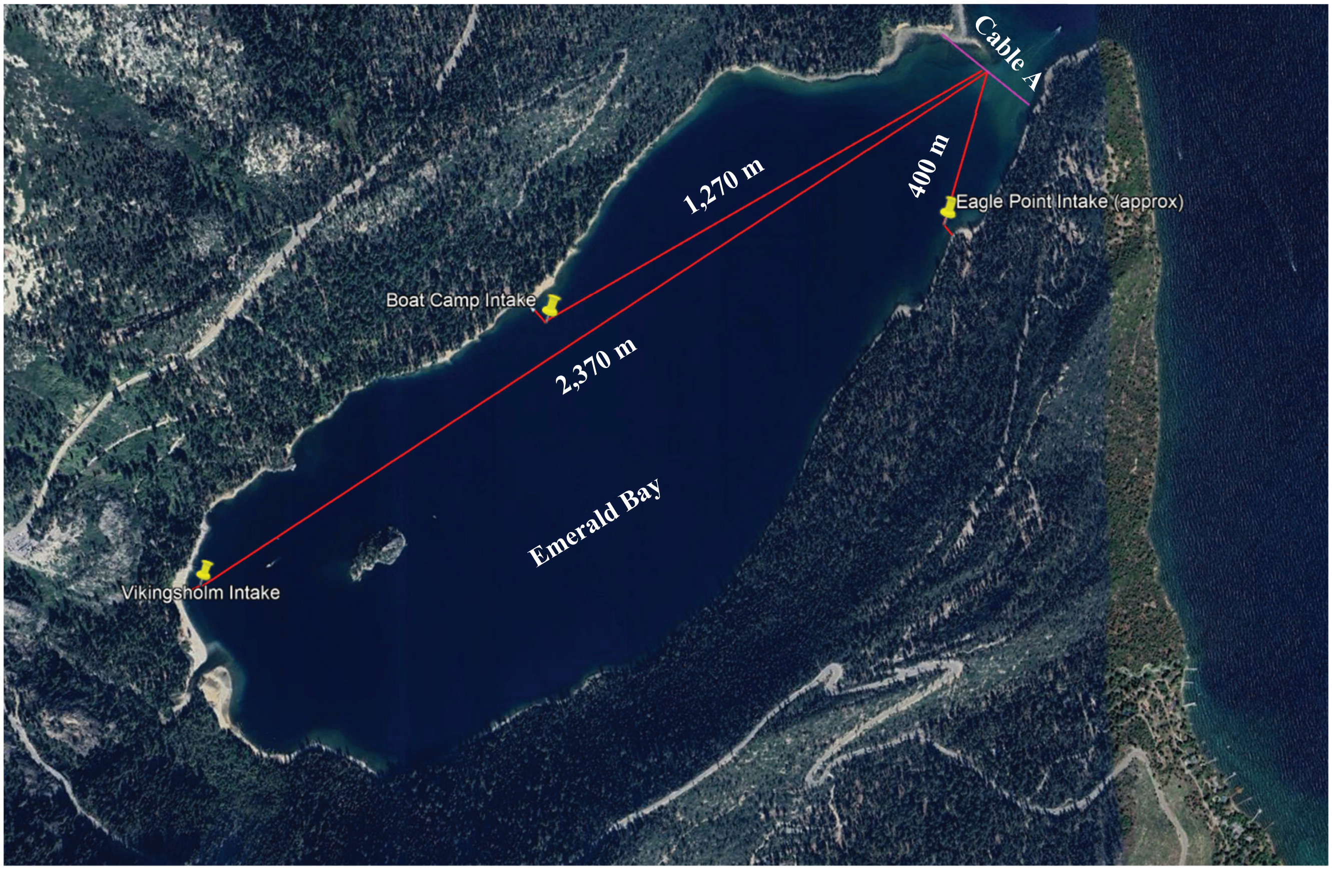

Figure 12. Distances between Cable A and Water Treatment Systems Reliant on Lake Tahoe

In fact, the data indicates that plumbing system components contribute discernable concentrations of lead to drinking water, and yet even after these contributions, the drinking water still meets the drinking water lead standard.

Additionally, the surface water-sourced systems are equipped with treatment processes that reduce suspended solids/particulates/turbidity loads which may contain lead particulates, such as:

1. filtration unit processes (diatomaceous earth filters or nanofiltration membranes) and
2. automatic online turbidity monitoring that places these systems into protective recirculation mode to prevent turbidity loads from clogging filters and membranes, and further protecting consumers.

As described in Section 9, the intake locations of the Vikingsholm and Boat Campground Systems reportedly makes them more susceptible to increased turbidity loads from boating traffic, while based on reviewed documentation, the Eagle Point intake is not as impacted by boat traffic. Therefore, CDPR's deployment of membrane-based water treatment processes at Vikingsholm and Boat Campground appears to be consistent with known site conditions since

membrane-based processes are generally capable of increased particulate removal efficiencies compared to media filters, such as diatomaceous earth.

Lastly, while little water treatment process information was gathered from the reviewed documents for groundwater-sourced systems, it should be noted that subsurface substrate through which groundwater travels[192] acts as a particle filter itself as groundwater is subjected to physical and chemical attenuation processes (e.g., dispersive mixing, adsorption, etc.), before the groundwater is pumped via wells for drinking water treatment and distribution to consumers.

[192] It is a known phenomena that local geology can contribute constituents to groundwater (e.g., iron, manganese, etc.). Based on my review of available raw groundwater data from wells used to supply the drinking water systems (Table 1, Figure 10), reported lead concentrations are below the RL or MDL (<1 ppm or <5 ppm).

11 Opinions

Opinion 1 – There are no detected impacts from lead-clad cables on the drinking water systems located within 2 miles of the cables, and all water samples are below the 15 ppb Action Level.

I identified three water systems, Eagle Point, Vikingsholm, and Boat Camp, that rely on Lake Tahoe surface water for their water supply within 2 miles of the lead-clad cables. On June 1, 2023, water collected from the Eagle Point System intake that draws from Emerald Bay was non-detect (<0.500 ppb) for lead. Treated water from the Eagle Point System was sampled on June 13, 2023, measured 0.602 ppb lead. Historical sampling of the Eagle Point, Vikingsholm, and Boat Camp System intakes on October 20, 1990, determined lead concentrations to be <5 ppb (i.e., non-detect with a 5 ppb reporting level). Therefore, surface water intakes and treated drinking water at Eagle Point meet EPA's 15 ppb lead Action Level for drinking water.

I also identified four water systems, Camp Richardson, Baldwin Beach, Cascade Mutual Water Company, and Tahoe City Public Utility Districts' (TCPUD) Rubicon System within 2 miles of the lead-clad cables, that rely on groundwater for production of drinking water. These systems do not draw water directly from Lake Tahoe, but instead tap into local aquifers, sometimes up to several hundred feet underground, for their source water. The Camp Richardson System (4.3 ppb [90^{th} %-ile result, n = 10] sampled on September 30, 2023), and the Rubicon System (7.8 ppb [90^{th} %-ile result, n = 10] sampled in 2021) meet EPA's 15 ppb lead Action Level for drinking water. (No lead data was found for Baldwin Beach and Cascade Mutual Water Company systems for either drinking water or source groundwater.)

Lastly, I identified one system, the D.L. Bliss System, that relies on a spring-fed stream source located within 2 miles of the cables. Historical sampling of the D.L. Bliss System on October 20, 1990, determined lead concentrations to be <5 ppb (non-detect), meeting EPA's 15 ppb lead Action Level for drinking water.

Opinion 2 – The raw surface water data is consistent with the findings stated in the expert report of Dr. Craig Jones that any mobilized lead released from the cables would not quantifiably impact water quality at locations away from the cables.

Both the Ramboll and Haley & Aldrich studies collected water samples adjacent to the cables in 2023 and 2021, respectively. Each study reported lead concentrations for reference samples

collected away from the cables including in Emerald Bay. The Ramboll and Haley & Aldrich samples were analyzed for both dissolved (filtered samples) and total (unfiltered samples) lead concentrations. In the Ramboll study, a majority of the results were non-detect (<0.006 ppb), with maximum total lead concentration of 0.064 ppb, and maximum dissolved lead concentration of 0.049 ppb.[193] The Emerald Bay reference samples ranged from non-detect (<0.006 ppb) to 0.007 ppb for dissolved lead, and from 0.010 to 0.018 ppb for total lead.[194] In the Haley & Aldrich study, majority of results were non-detect (<0.043 ppb), with maximum total lead concentration of 0.060 ppb (at a background location, and 0.057 ppb adjacent to Cable A), and maximum dissolved lead concentration of 0.080 ppb adjacent to Cable A in Emerald Bay.[195]

As shown on Figure 12, lead-clad Cable A is located approximately 400 meters away from the Eagle Point System intake. Maximum lead concentrations in the Ramboll and Haley & Aldrich studies were 0.064 and 0.060 ppb for total lead, and 0.049 ppb and 0.080 ppb for dissolved lead, respectively. Ramboll's 2023 Emerald Bay water samples collected from "Reference 2" location, which is in close proximity to the Eagle Point System intake, were non-detect (<0.006 ppb) for dissolved lead, and 0.016 and 0.018 ppb for total lead. As described in this report, CDPR's 2023 Eagle Point System intake water sample was non-detect for lead at a relatively high method reporting limit of <0.5 ppb, making it non-comparable to the more sensitive methods employed for the analyses of Ramboll and Haley & Aldrich's samples. Assuming that data from Ramboll's "Reference 2" location is a representative surrogate for the Eagle Point intake lead concentration (<0.006 to 0.018 ppb), then the Eagle Point treated water sample (0.602 ppb) is 1 to 2 orders of magnitude larger. As described in Section 10, this increase of lead concentrations from environmental samples to drinking water samples is consistent with corrosion of plumbing components, even those deemed historically to be classified as "lead-free."

This compiled surface water lead concentration data is consistent with dispersion modeling performed by Dr. Jones, whose results show that any lead released from the cables is rapidly diluted and dispersed within the lake water.[196] According to Dr. Jones' report, using accepted modeling methodology, the concentration of any lead released is diluted by over an order of magnitude within a distance of 5 meters away from the source. Instead, there appears to be greater potential for accumulating lead from plumbing components conveying drinking water

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193 Ramboll. 2023. Lake Tahoe Water Lead Study. Lake Tahoe, California. Table 1-1.

194 Ramboll. 2023. Lake Tahoe Water Lead Study. Lake Tahoe, California. Table 1-1.

195 Haley & Aldrich. 2024. Supplemental Report on Lake Tahoe Field Sampling and Analysis of Impacts of Legacy Telecommunication Cables on Water Quality. South Lake Tahoe, California. Table 1.

196 Jones. 2024. Opinions Regarding Lead Fate and Transport in the Matter or California Sportfishing Protection Alliance v. Pacific Bell Telephone Co.; Eastern District of California Case No. 2:21-cv-00073-JDP. Integral Consulting Inc.

sourced from Lake Tahoe than from the proximity of the Lake Tahoe surface water intake to the lead-clad cables. The closest surface water intake from the lead-clad cables is for the Eagle Point System which is approximately 400 meters away from Cable A (Figure 12).

References

40 CFR 141.86(a). https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-141/subpart-I/section-141.86

40 CFR 141.86(b)(2). https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-141/subpart-I/section-141.86

56 Federal Register 26460 - 26564, June 7, 1991. https://archives.federalregister.gov/issue_slice/1991/6/7/26457-26582.pdf

CA Drinking Water Watch. Ca State Parks - D.L. Bliss (0910301). All Sampling Results. Accessed on June 14, 2024.

CA Drinking Water Watch. Ca State Parks - Emerald Bay, Boat Campg (0910305). All Sampling Results. Accessed on June 14, 2024.

CA Drinking Water Watch. Ca State Parks - Emerald Bay, Vikingsholm (0910302). All Sampling Results. Accessed on June 14, 2024.

CA Drinking Water Watch. Tahoe City PUD - Rubicon (CA0910012) https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=295&tinwsys_st_code=CA Accessed on June 14, 2024.

CA Drinking Water Watch. Violations. Water System Name: Cascade Mutual Water Company. https://sdwis.waterboards.ca.gov/PDWW/JSP/Violation.jsp?tinwsys_is_number=8514&tinwsys_st_code=CA&tmnviol_is_number=39745&tmnviol_st_code=CA Accessed on June 13, 2024.

CA Drinking Water Watch. Violations. Water System No.: CA0900649. Water System Name: South Shore Recreation Area. https://sdwis.waterboards.ca.gov/PDWW/JSP/Violations.jsp?tinwsys_is_number=8548&tinwsys_st_code=CA Accessed on June 13, 2024.

CA Drinking Water Watch. Water System Detail. Water System No.: CA0910303. Water System Name: Ca State Parks - Emerald Bay, Eagle Point. https://sdwis.waterboards.ca.gov/PDWW/JSP/NMonitoringSchedules.jsp?tinwsys_is_number=309&tinwsys_st_code=CA Accessed on June 13, 2024.

CA Drinking Water Watch. Water System Details. Water System Name: Cascade Mutual Water Company. https://sdwis.waterboards.ca.gov/PDWW/JSP/AllPbCuResults.jsp?tinwsys_is_number=8514&tinwsys_st_code=CA&Chem=25 Accessed on June 13, 2024.

CA Drinking Water Watch. Water System Details. Water System No.: CA0900649. Water System Name: South Shore Recreation Area. https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=8548&tinwsys_st_code=CA&counter=0 Accessed on June 13, 2024.

CA Drinking Water Watch. Water System Details. Water System No.: CA0900654. Water System Name: Baldwin Beach. https://sdwis.waterboards.ca.gov/PDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=8553&tinwsys_st_code=CA&counter=0 Accessed on June 13, 2024.

CA Water Boards. GAMA Groundwater Information System. CA0900523_001_001. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600900523&assigned_name=CA0900523%5F001%5F001&store_num Accessed on June 13, 2024.

CA Water Boards. GAMA Groundwater Information System. CA0900649_001_001. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/GamaDataDisplay.asp?dataset=DHS&samp_date=&global_id=W0600900649&assigned_name=CA0900649%5F001%5F001&store_num Accessed on June 17, 2024.

Cal. Code Regs. tit. 22 § 64413.3 https://casetext.com/regulation/california-code-of-regulations/title-22-social-security/division-4-environmental-health/chapter-15-domestic-water-quality-and-monitoring-regulations/article-2-general-requirements/section-644133-classification-of-distribution-systems

California Integrated Water Quality System (CIWQS). 2023. DL Bliss Sanitary Sewer Systems General Order Questionnaire. February 14.

California State Water Boards. Water System Type. https://sdwis.waterboards.ca.gov/PDWW/Help/html_Water_System_Type.htm Accessed on June 13, 2024.

California State Water Resources Control Board (SWRCB). 2017. Groundwater Fact Sheet Lead (Pb). November. https://www.waterboards.ca.gov/gama/docs/coc_lead.pdf Accessed on June 13, 2024.

CDPR. 1991. Hand-drawn schematic of the Eagle Point Campground water system.

CDPR. 2007. Surface Water Assessment Forms. Emerald Bay State Park – Vikingsholm Castle.

CDPR. 2007. Surface Water Assessment Forms. Eagle Point Campground. February.

CDPR. 2012. Handwritten Schematic of the Vikingsholm System prepared for the 2012 inspection. August 20.

CDPR. 2019. Eagle Point Campground Daily Waterplant Operations Manual. June.

CDPR. 2023. 2023 Compliance Inspection Of the Emerald Bay State Park – Eagle Point Public Water System.

CDPR. 2023. Monthly Summary of Monitoring for Surface Water Treatment Regulations. June and September 2023.

CDPR. 2023. Seasonal Water System Shutdown Notification & Start-Up Certification Form. Emerald Bay State Park – Eagle Point Campground, CA 0910303. June 13.

CDPR. 2023. Sewer System Management Plan for DL Bliss.

CDPR. 2024. Approximate GPS Coordinates of Intakes.

CDPR. 2024. D.L. Bliss Closed for the 2024 summer season. https://www.parks.ca.gov/?page_id=505 Accessed June 25, 2024.

CDPR. 2024. D. L. Bliss Map.

CDPR-WSJ Email Exchange. 2023. Email from CDPR to WSJ dated June 16, 3:11 pm.

CDPR-WSJ Email Exchange. 2023. Email from CDPR to WSJ dated June 6, 8:22 pm.

CDPR-WSJ Email Exchange. 2023. Email from CDPR to WSJ dated May 25, 5:47 pm.

Chien, C. et. al. (2019). Evaluation of atmospheric dry deposition as a source of nutrients and trace metals to Lake Tahoe. Chemical Geology, 511, 178-189.

Cranmer Engineering Inc. 2023. Eagle Point Distribution Laboratory Report, dated June 15, 2023.

CSPA v. Pacific Bell. Complaint For Declaratory And Injunctive Relief And Civil Penalties. Filed January 14, 2021.

Department of Health Services (DHS). 2005. Water Supply Permit No. 01-09-04-PER-010 package.

DHS. 2005. D.L. Bliss. DE Treatment Plant and Distribution schematic. August 4.

Ecologic Engineering. 2004. Engineering Report for Installation of New 30 gpm Diatomaceous Earth Water Treatment Plant. January.

Groundwater Ambient Monitoring and Assessment (GAMA) databases. https://www.waterboards.ca.gov/gama/online_tools.html Access on June 13, 2024.

Haley & Aldrich. 2024. Supplemental Report on Lake Tahoe Field Sampling and Analysis of Impacts of Legacy Telecommunication Cables on Water Quality. South Lake Tahoe, California.

Jones. 2024. Opinions Regarding Lead Fate and Transport in the Matter of California Sportfishing Protection Alliance v. Pacific Bell Telephone Co.; Eastern District of California Case No. 2:21-cv-00073-JDP. Integral Consulting Inc.

Ramboll. 2023. Lake Tahoe Water Lead Study. Lake Tahoe, California.

Safe Drinking Water Information System (SDWIS) database. https://sdwis.waterboards.ca.gov/PDWW/ Access on June 13, 2024.

Sakaji et al. 2001. California Surface Water Treatment Alternative Filtration Technology Demonstration Report. June. https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwdocuments/aftr6_2001.pdf

Schneider Co. 1996. Model 85 Filter System Manual.

South Shore Recreation Area. 2018 CCR Accessed on June 13, 2024.

South Shore Recreation Area. 2021 CCR Accessed on June 13, 2024.

South Shore Recreation Area. 2023 CCR Accessed on June 13, 2024.

State Water Resources Control Board (SWRCB). 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1.

SWRCB. 2000. Engineering Report, Emerald Bay State Park – Boat Camp, Public Water System No. 0910305. June 5.

SWRCB. 2000. Engineering Report, Emerald Bay State Park – Eagle Point, Public Water System No. 0910303. May 1.

SWRCB. 2020. Pumping Station Data.

SWRCB. 2014. 2014 Compliance Inspection Report & Letter DL Bliss (CA0910301).

SWRCB. 2020. Emerald Bay State Park – Vikingsholm Public Water System (PWS# 0910302). Permit No. 01-09-20-PER-008. May 22.

SWRCB. 2022. 2022 Compliance Inspection Report & Letter DL Bliss (CA0910301).

SWRCB. 2024. 2023 Electronic Annual Report DL Bliss. March 7.

Tahoe Regional Planning Agency. Regional Plan Update Draft EIS. https://www.trpa.gov/wp-content/uploads/documents/archive/3.13_Public_Svcs__Util.pdf Accessed on June 13, 2024.

Tahoe Regional Planning Agency. Tahoe Open Data. Water service area boundaries. https://www.tahoeopendata.org/datasets/TRPA::tahoe-planning-and-jurisdiction-layers/explore?layer=20&location=39.012674%2C-120.104345%2C14.00&showTable=true Accessed on June 17, 2024.

TCPUD. 2023. CCR for Tahoe City. https://www.tcpud.org/sites/default/files/TCPUD%20CCR%202023%20Final%205-28-24%20(Added%20UCMR5%20results%20and%20PN)_0.pdf Accessed on June 13, 2024.

TCPUD. Water Quality. https://www.tcpud.org/water-quality. Accessed on June 13, 2024.

US EPA. 2008. Lead and Copper Rule: A Quick Reference Guide. June. EPA 816-F-08-018. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=60001N8P.txt

US EPA. 2009. National Primary Drinking Water Regulations table. May. EPA 816-F-09-004. https://www.epa.gov/sites/default/files/2016-06/documents/npwdr_complete_table.pdf

US EPA. 2020. Understanding the Lead and Copper Rule. September. https://www.epa.gov/sites/default/files/2019-10/documents/lcr101_factsheet_10.9.19.final_.2.pdf

US EPA. 2023. Lead and Copper Rule: Rule Summary. November. https://www.epa.gov/dwreginfo/lead-and-copper-rule

US EPA. 2024. Basic Information about Lead in Drinking Water. June. https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water

US EPA. 2024. Use of Lead Free Pipes, Fittings, Fixtures, Solder, and Flux for Drinking Water. June.

USFS. 2024. Baldwin Beach at a Glance.
https://www.fs.usda.gov/recarea/ltbmu/recarea/?recid=11778

Appendix A

Curriculum Vitae of Alex Revchuk, D.Env., P.E., BCES

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Alex Revchuk, D.Env., P.E., BCES

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Professional Profile

Dr. Revchuk provides professional science, engineering, and litigation support consulting services in several areas including drinking water treatment process optimization, beverage manufacturing, process failure root cause analysis, engineering cost estimation, selection of environmental remediation alternatives, environmental forensics, environmental damage allocation, regulatory compliance, and impacts of wildfires on surface water supplies. Dr. Revchuk advises private commercial and industrial entities, beverage manufacturers, medical and recreational facilities, biomedical device manufacturers, public agencies, and utilities in energy production, water, and wastewater sectors.

In the water treatment and beverage manufacture arena, Dr. Revchuk focuses on bench- and pilot-scale studies, costing, preliminary design, and optimization of conventional, ion exchange, reverse osmosis/desalinization, ozone, biological, and proprietary water treatment systems. He also assists clients with process upgrades, project management, development of standard operating procedures that incorporate Good Manufacturing Practices (GMPs), strengths, weaknesses, opportunities, and threats (SWOT), and hazard analysis critical control point (HACCP) analyses.

In the environmental remediation arena, Dr. Revchuk specializes in the evaluation of suitable groundwater and soil remediation alternatives including efficacy, technical limitations, cost estimation, permitting, and regulatory approval for a wide range of chemicals including petroleum hydrocarbon compounds, chlorinated solvents, pesticides, metals, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

During his graduate work, Dr. Revchuk developed natural organic matter (NOM) characterization techniques to identify and classify organic matter in surface waters of California and Colorado. His doctoral thesis explored the impacts of southern California wildfire ash contamination (a type of NOM) on drinking-water supplies and treatment strategies to produce drinking water from wildfire-affected waters.

Academic Credentials & Professional Honors

D.Env., Environmental Science and Engineering, University of California, Los Angeles (UCLA), 2011

M.S., Environmental Health Sciences, University of California, Los Angeles (UCLA), 2006

B.S., Environmental Systems, University of California, San Diego, 2004

Bay Area Water Works Association (BAWWA), Board Member

UCLA Environmental Science & Engineering Program Endowment, 2006-2008

Completed ABET/ASAC Accredited Industrial Hygiene M.S. Program, UCLA, 2006

Environmental Systems Major Thesis of the Year, UCSD, 2004

California Institute for Telecommunications and Information Technology, Cal-(IT)^2, Fellow of the Year, UCSD, 2002

Licenses and Certifications

Licensed Professional Civil Engineer, California #84362

Licensed Professional Civil Engineer, Nevada #025178

Board Certified Environmental Scientist (BCES) in Surface Water Resources, #14-60010, Board of American Academy of Environmental Engineers and Scientists

HAZWOPER 40-hour Training

Prior Experience

Scientist/Engineer, Water Quality and Treatment Solutions (WQTS) Inc., 2008-2012

Graduate Lab Researcher IV, UCLA, Environmental Water Quality Lab, 2004-2008

Project Researcher, Castaic Lake Water Agency, Rio Vista Water Plant/Carollo Engineers, 2006

Project Developer and Technician, Scripps Institution of Oceanography, 2001-2004

Professional Affiliations

Bay Area Water Works Association (BAWWA), 2013-present (board member)

American Academy of Environmental Engineers and Scientists, 2014 — present (member)

American Water Works Association (AWWA), 2004-present (member)

Languages

Russian

Publications

Revchuk AD, Murphy E, Rackl, S. "Building Operating Management COVID-19 Reopening Risk: Is There Legionella in Your Building's Water?" FacilitiesNet, August 2020.

Electric Power Research Institute (EPRI), Revchuk AD (co-author). Chemical Constituents in Coal Combustion Products: Cobalt. 3002016497. Palo Alto, California, 2019.

Electric Power Research Institute (EPRI), Revchuk AD (co-author). Chemical Constituents in Coal Combustion Products: Lithium. 3002012311. Palo Alto, California, 2018.

Mesard PM, Marjanovic, KC, Revchuk, AD, Schew, W. A Breath of (not-so-) Fresh Air? Recent Regulatory Guidance for Soil Vapor Intrusion Assessments with a Focus on Biogenic Methane. Environmental Perspectives Newsletter, Exponent. January 2017.

Revchuk AD, Suffet IH (Mel). Effect of wildfires on physicochemical changes of watershed dissolved organic matter. Water Environment Research, 2014; 86(4): 372-381. DOI: http://dx.doi.org/10.2175/106143013X13736496909671.

Revchuk AD, Philibert MA, Billica J, Suffet IH (Mel). The relationship of size, polarity and THMFP of DOC in Northern Colorado watersheds. Proceedings, AWWA Annual Conference, San Diego, CA, 2009.

Revchuk AD. Evaluation of the quality assurance of ultrafiltration separation for humic substances by chemical probes. Proceedings,14th Meeting of International Humic Substances Society, Moscow, Russia, 2008.

Presentations

Revchuk AD, Tanaka, G, Head, R. What's the Big Deal about PFAS and Why Should You Care? Presentation at the Association of California Water Agencies (ACWA) Fall Conference, San Diego, California, December 2019.

Revchuk AD, Thacher R. Follow the Water: Causes and Implications of Failures in Industrial and Commercial Water Systems. Presentation at the Southern California Joint Technical Symposium (JTS): American Industrial Hygiene Association (AIHA) and American Society of Safety Professionals (ASSP). Carson, California, October 2019.

Revchuk AD, Suffet IH (Mel). Physicochemical Changes of Wildfire-Derived DOM & Precipitation Effects during First Year Recovery. Presentation at The Fire Continuum Conference: Preparing for the Future of Wildland Fire; organized by Association for Fire Ecology and International Association of Wildland Fire. Missoula, Montana, May 2018.

Revchuk AD. Forensic engineering in water treatment and beverage production. Presentation to South Bay Engineers' Club, Fremont, California, April 2017.

Revchuk AD, Suffet IH (Mel). Burning questions regarding drinking water supplies and treatment. Presentation at the American Chemical Society Annual Meeting, San Francisco, California, April 2017.

Revchuk AD. Wildfire-Induced Physicochemical Changes in DOM: Watershed Dynamics and Water Treatment. Presentation to the Bay Area Water Works Association (BAWWA), San Francisco, March, 2014.

Revchuk AD, Najm I, Suffet IH (Mel), Billica J. Use of physicochemical changes in NOM to evaluate THM formation during snowmelt, after wildfires, and in pre-ozonation water treatment. Proceedings, 4th IWA Specialty Conference Natural Organic Matter: From Source to Tap and Beyond, Irvine, CA, 2011.

Revchuk AD, Najm I, Suffet IH (Mel). Wildfire-derived DOM: Physicochemical changes caused by annual precipitation events. Proceedings, AWWA Water Quality Technology Conference, Savannah, GA, 2010.

Revchuk AD, Najm I, Suffet IH (Mel). Wildfire-induced physicochemical changes in Santa Barbara source water DOC and the subsequent ozone treatment evaluation. Proceedings, AWWA Annual Conference, Chicago, IL, 2010.

Revchuk AD, Suffet IH (Mel). Ultrafiltration separation of aquatic natural organic matter: Chemical probes for quality assurance. Water Research 2009; 43(15):3685-3692.

Project Experience

Drinking Water Treatment

Conducted performance optimization evaluation of seawater desalinization treatment plant consisting of media filtration, multistage ultrafiltration (UF), multistage reverse osmosis (RO), and ultraviolet (UV) disinfection processes. Performed strengths, weaknesses, opportunities, and threats (SWOT) analyses on the complete process, including water treatment, generally recognized as safe (GRAS) ingredients, raw materials, packaging, employee training and qualifications. Oversaw technical implementation of

recommendations and regulatory agency interactions. Developed standard operating procedures (SOPs) for the optimized water treatment and product handling production.

Conducted a forensic evaluation of a water treatment system designed for production of critical water for a hospital. Evaluated functionality of unit treatment processes including ion exchange softeners, carbon filters, RO, UV disinfection, water storage reservoirs, and recirculation systems. Reviewed and optimized maintenance and disinfection practices.

Operated a conventional pilot treatment train with pre-ozonation to evaluate disinfection by-product (DBP) minimization strategies following wildfires. Full-scale ozone contactor was constructed based on this pilot study. Evaluated wildfire-induced physicochemical changes in dissolved natural organic matter, post-fire watershed dynamics, and water treatment of wildfire-affected waters in order to improve coagulation efficiency, reduce membrane fouling, and minimize the production of carcinogenic disinfection by-products, such as trihalomethanes (THMs) and haloacetic acids (HAAs), during disinfection.

Conducted Step-2 Enhanced Coagulation criteria testing of the Stage 1 D/DBP Rule for several drinking-water treatment facilities in southern California. Established points of diminishing returns for facilities with raw waters not amenable to enhanced coagulation.

Conducted analyses of aged municipal water wells including evaluations of surrounding hydrogeological conditions, effectiveness and efficiencies of various pumping depths and pumping regimes, annular seal integrities, and impacts of corrosion on well performance.

Performed research related to mass and polarity characterization of natural organic matter (NOM) in drinking-water supplies. Evaluated spatial and temporal changes of NOM and their effects on water treatment plants in Colorado. Made recommendations on water source selection and coagulation optimization.

Conducted a series of rapid small-scale column tests (RSSCTs) to evaluate total organic carbon (TOC) breakthrough on the post-filter adsorber granular activated carbon (GAC). Provided recommendations for GAC replacement rates.

Evaluated a range of ion exchange (IX) resins for removal of nitrate and organic color from groundwater. Developed optimal resin regeneration process. Best performing resin was selected for further pilot-scale demonstration. Operated and optimized an IX pilot treatment plant for removal of nitrate an organic color. Full-scale plant is currently in design based on the pilot scale testing.

Conducted sampling and analysis of groundwater sources for over 50 constituents. Evaluated a range of treatment alternatives, including conventional coagulation/filtration and ion exchange.

Operated an ozonation pilot treatment unit to evaluate the effect of ozone generator feed gas on the production of bromate. Evaluated bromate formation by ozone generated from ambient air and liquid oxygen (LOX). Based on the pilot study findings, a full-scale LOX facility was built at the water treatment plant.

Operated a bench scale electrochemical oxidation reactor prototype for the removal of bromide and nitrate. Performed reactor optimization and aquatic chemistry procedures.

Conducted a series of filter coring procedures in open-top and vessel filters. Filter media evaluations were used to establish a media replacement schedule.

Beverage Production

As part of a Food and Drug Administration (FDA) recall, performed a root cause analysis for a beverage product experiencing bacteriological growth in final bottled configuration. Evaluated ingredient sourcing,

ingredient formulation and batching, pasteurization, bulk container handling, and bottling operations and practices. Conducted site visits, inspected equipment, reviewed records, and interviewed executives of the bottling operations. Prepared and submitted a report to the FDA. Assisted client with relaunching of the product using alternative formulator and bottler.

Conducted a hazard analysis critical control point (HACCP) inspection of a mineral water treatment and bottling plant in Western Asia primarily in preparation for an FDA inspection. Inspection included review of product formulation, sourcing, treatment, carbonation, microbiological and chemical quality control, packaging, product storage, shipping, industrial hygiene, and worker safety. Reviewed ISO 9001 (quality management system), ISO 17025 (competence of testing and calibration laboratories), and ISO 22000 (food safety management system) certified practices. Provided critical, semi-critical, and non-critical recommendations to be implemented prior to FDA's inspection.

Evaluated design, construction, start-up, optimization, performance, and defects associated with a filtration and softening water treatment system at a large dairy facility. Guided field inspections and samples collection. Conducted filtration media evaluations including scanning electron microscopy (SEM), and energy dispersive spectroscopy (EDS) analyses. Evaluated source water quality, and pump and pipe sizing designs. Reviewed delay claims associated with substandard water quality and its effects on dairy operations.

Investigated a bottled water treatment and bottling facility for alleged illicit production practices which included covert piping connections and product formulations. Assessed staff training and competency. Conducted a screening and interviewing process for replacement staff. Performed treatment process optimization, SOP and maintenance plan development. Interacted and collaborated with state regulators.

Consumer Products Evaluation and Development

As part of a National Sanitation Foundation (NSF) recall of particular water valves (per (NSF/ANSI/CAN 61 "Drinking Water System Components - Health Effects"), investigated concentrations of leachables from epoxy coatings used in the valves. Guided field inspections and sample collection. Conducted theoretical calculations and evaluated leaching studies data via thermal desorption/gas chromatography-mass spectrometry instrumentation (TD/GC MS).

Assisted a consumer products company with implementing anti-scaling technologies in miniature boiler systems. Hard water scale substantially reduced product lifetimes. Assessed quality of waters from regions with most failures, reviewed product design, and assessed spatial considerations. Conducted a treatment technology screening, and developed designs, flow and flow control configurations. Developed a detailed bench-scale test plan and reviewed and summarized results. Bench-scale testing substantially increased operational lifetimes of the systems.

Conducted a survey of water-for-injection (WFI) biomedical equipment in all stages of development, from on the market products, to medical trial equipment, to patents and concepts. Identified water quality constituents dangerous for dialysis patients; selected water treatment processes to treat for these constituents; ranked equipment based on effectiveness of unit processes; ease of sterilization; energy-, space-requirements, loudness, and many other factors, including costs, and anticipated time-to-market.

Conducted a market research survey to evaluate the demand for calcium carbonate pellets produced as a by-product of a water-softening treatment process. Survey spanned a wide range of markets ranging from cement manufacture to agriculture and livestock. Treatment process feasibility was directly linked to cost recovery through sale of the by-product. Several viable buyers were identified.

Buildings and Indoor Pipe Networks

Conducted chemical and microbiological evaluations of water quality in medical facility buildings to determine causes, sources, and distribution of contaminants. Developed sampling plans, mitigation and

remediation actions, managed field personnel crews. Evaluated causes of algal deposits in dialysis water distribution systems and proposed alternative operations and maintenance procedures to eliminate the algal growth and deposition.

Developed a water quality management and flushing program for a newly-constructed medical facility that was being commissioned months after construction completion. Conducted chemical and microbiological (including Legionella, heterotrophic plate count, total coliform, and E. coli) evaluations, optimized flushing schedule, reviewed hyperchlorination disinfection practices.

Investigated operational and maintenance practices of pool and spa equipment at a large aquatic facility and wellness center. Assessed treatment efficacy (filtration, ozonation, UV disinfection, water heating), chemical dosing practices, pool and spa water quality, documentation and record-keeping practices, personnel training, standard operating procedures, safety practices and controls. Conducted a review of state-of-the-art best-practice regulations and guidance for pool equipment and pool operations. Prepared critical and semi-critical recommendations and oversaw system stabilization and optimization.

Conducted an investigation and characterization of water quality in residential high-rises in a western US city that experienced multiple interior piping failures. Developed sampling and testing plans and managed the sampling teams. Evaluated heating and mechanical equipment operations. Evaluated and interpreted water quality data to determine potential relationships between water quality and degradation of piping materials.

Industrial Water and Wastewater Treatment

Conducted an independent evaluation of water and wastewater treatment processes and practices at five coal/gas-fired power plants in southeast United States, including water treatment processes related to the power cycle, wastewater handling and treatment practices, and ash pond dewatering optimization. Reviewed design criteria, engineering drawings, technical reports, etc. The water and wastewater process evaluation and optimization served as a foundation for the toxicity evaluation.

Conducted analysis of thermal power plant waste streams, evaluated remediation treatment alternatives for the waste streams, including feasibility and cost estimates. Evaluated plant effluent data to assess treatment alternatives, treatment limitations, and disposal options for the dried treatment concentrate. Calculated the feasibility of expanding onsite landfills and estimated the necessary capacities and usable life projections. Developed multiple capital and operations and maintenance (O&M) cost estimates to compare alternatives, including conducting net present value (NPV) analyses.

Investigated the causes of continued contamination of a water treatment and distribution system at a pharmaceuticals manufacturing facility in the eastern United States. Evaluated the equipment replacement and optimization strategy undertaken by the manufacturer. Conducted an audit of GMPs and HACCPs.

Conducted a water quality characterization and operational optimization of a permanent dewatering system for a skyscraper in southern California. Evaluated regulatory compliance and performance of air strippers, filters, and resin treatment used as part of the dewatering system. Developed and implemented a water quality sampling program to assess system performance. Identified and procured alternative treatment technologies and assisted with design of new equipment. Conducted a SWOT analysis and implemented improvements to increase the dewatering system resilience.

Evaluated feasibility and treatment alternatives for removal of metals, color and turbidity from dewatering discharges at a multistory commercial building on the east coast. Assessed efficiencies of several treatment technologies. Evaluated installation, operations, and maintenance requirements.

Evaluated the design, construction, and operation of a manure transfer system at a dairy in Vermont that resulted in explosive decompression causing operator injury. Assessed practice standards, operational awareness, and operator decision-making.

Municipal Wastewater Treatment

Conducted sewer capacity calculations and evaluated wastewater treatment practices at a large multi-year industrial construction site in the Middle East. Reviewed planning documents, interim disposal practices, and construction delay claims associated with wastewater.

Developed odor mitigation approaches for a sewer lift station located in a residential development, including chemical dosing, manhole cover inserts, flow optimization, installation of turbulence-reducing devices, etc. Developed work plans for installation and operation of a pilot scale chemical dosing plant, retrofitting of an existing lift station, and restarting the operations of the existing lift station. Performed preliminary design and cost estimation. Interacted with concerned residents, local officials, regulators, technical staff, and vendors.

Conducted hydraulic testing of newly built full-scale wastewater chlorine contactors to meet recycled water disinfection requirements under Title 22. Tracer testing was required by the California Department of Public Health (CDPH) to identify the flow rate necessary to achieve a minimum modal time of 90 minutes to ensure that adequate disinfection of the recycled water is maintained.

Operated a demonstration-scale experimental pellet softening water treatment process to reduce the volume of reverse osmosis (RO) waste brine. Full-scale process designed and constructed based on this pilot study, generating pellets for a variety of commercial and industrial uses.

Assessed a municipal wastewater treatment system process and its relationship to an associated poplar grove irrigation system used for beneficial reuse of treated wastewater effluent. Evaluated design and operation intentions of the failed irrigation system, which was used as a wastewater treatment component for an end-use distribution system.

Environmental Remediation, Environmental Forensics, and Cost Estimation

Conducted an environmental assessment of a large steel mill in the midwestern US. Evaluated temporal changes in operations, waste type and management, effluent discharges, wastewater treatment processes, and analyzed pathways of specific chemical constituents of interest to sediment and groundwater. Constituents of interest included PCBs, benzene, metals, and PAHs.

Prepared technical reports on coal combustion product (CCP) constituents for an independent research and development organization. Reports focused on fate and transport, water treatment, wastewater handing, and environmental remediation alternatives for lithium, cobalt, and boron.

Conducted an environmental assessment of a large steel mill. Evaluated temporal changes in operations, waste type and management, effluent discharges, wastewater treatment, and analyzed pathways of chemical constituents to environmental media such as sediment and groundwater. Constituents of interest included PCBs, benzene, metals, and PAHs.

Led a field investigation to determine sources of water in vicinity of a large landslide. Performed groundwater sampling, and utilized aquatic, geochemical, and stable isotope techniques to determine sources of various waters.

Evaluated ex-situ (ion exchange, fluidized bed reactor) and in-situ (biological remediation) remediation technologies. Calculated and determined the feasibility and effectiveness of several groundwater treatment alternatives for the treatment and remediation of organic and inorganic groundwater contaminants, including nitrate. Feasibility of alternatives was based on treatment effectiveness, waste

stream production by various processes, site constraints, implementability, and maintenance. Calculated capital and O&M costs associated with the treatment systems.

Evaluated nitrate treatment alternatives for groundwater production, including advantages and disadvantages of ion exchange, reverse osmosis, and biological denitrification treatment, feasibility of the alternatives within site constraints, and order-of-magnitude opinions of probable capital, operational, and maintenance costs. Developed 3-D visualizations and models of the treatment alternatives.

Prepared cost estimates and conducted feasibility studies for mitigation and remediation alternatives for commercial and residential developments with vapor intrusion risks from petroleum and chlorinated solvent contamination. Evaluated potential efficacy, technical and cost limitations, permitting, and regulatory approval considerations.

Developed feasibility-level cost estimates for environmental remediation activities, including soil and groundwater investigation, groundwater well installation, and soil vapor extraction at a large former chemical manufacturing facility in southern California.

As part of a real estate transaction of a former manufacturing facility slated for brownfields redevelopment, prepared a fair value measurement-based forecast of environmental liabilities (per methods in ASTM E2137 and E2173) for remediation of sediments in a river next to the former facility. The forecast was used in the negotiations regarding the establishment of a remediation trust to fund future cleanup of river sediments, and to manage and minimize risks associated with the transaction.

Conducted a feasibility study of deploying turbines for energy recovery at reservoirs, in water treatment facilities, and in drinking-water distribution systems. Performed analyses of local topography, distribution system evaluations, and costs.

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Appendix B

Expert Testimony and Depositions of Alex Revchuk, D.Env., P.E., BCES (last 4 years)

Appendix B – List of Cases from Previous Four Years

Participated as an expert witness in the following case over the previous four years:

George M. Madison, II, Joann B. Madison, and William M. Madison v. United States of America. Case No. 2:21-cv-00231. United States District Court, District Of Vermont. Participation and contribution: Litigation Support, Expert Report, and Deposition in October 2022.

Gallagher, Orion et al. vs Real Water. Case No. A-21-834485-B; Case No. A831169 (Lead Case). District Court, Clark County, Nevada. Participation and contribution: Litigation Support, Expert Report, and Deposition in May 2023.

Hunwardsen, Myles et al. vs Real Water, et al. Case No. A-21-831543-B; Case No. A831169 (Lead Case). District Court, Clark County, Nevada. Participation and contribution: Litigation Support, Expert Report, and Deposition in October 2023.

Carrier et al. vs Real Water, et al. Case No. 2:21-AP-01243; Case No. A831169 (Lead Case). District Court, Clark County, Nevada. Participation and contribution: Litigation Support, and Expert Report in February 2024.